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SIZE DISTRIBUTION OF PINK SHRIMP, *Penaeus duorarum*, AND FLEET CONCENTRATIONS ON THE TORTUGAS FISHING GROUNDS

SPECIAL SCIENTIFIC REPORT–FISHERIES No. 356

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

United States Department of the Interior, Fred A. Seaton, Secretary
Fish and Wildlife Service, Arnie J. Suomela, Commissioner
Bureau of Commercial Fisheries, Donald L. McKernan, Director

SIZE DISTRIBUTION OF PINK SHRIMP, Penaeus duorarum, AND FLEET CONCENTRATIONS ON THE TORTUGAS FISHING GROUNDS

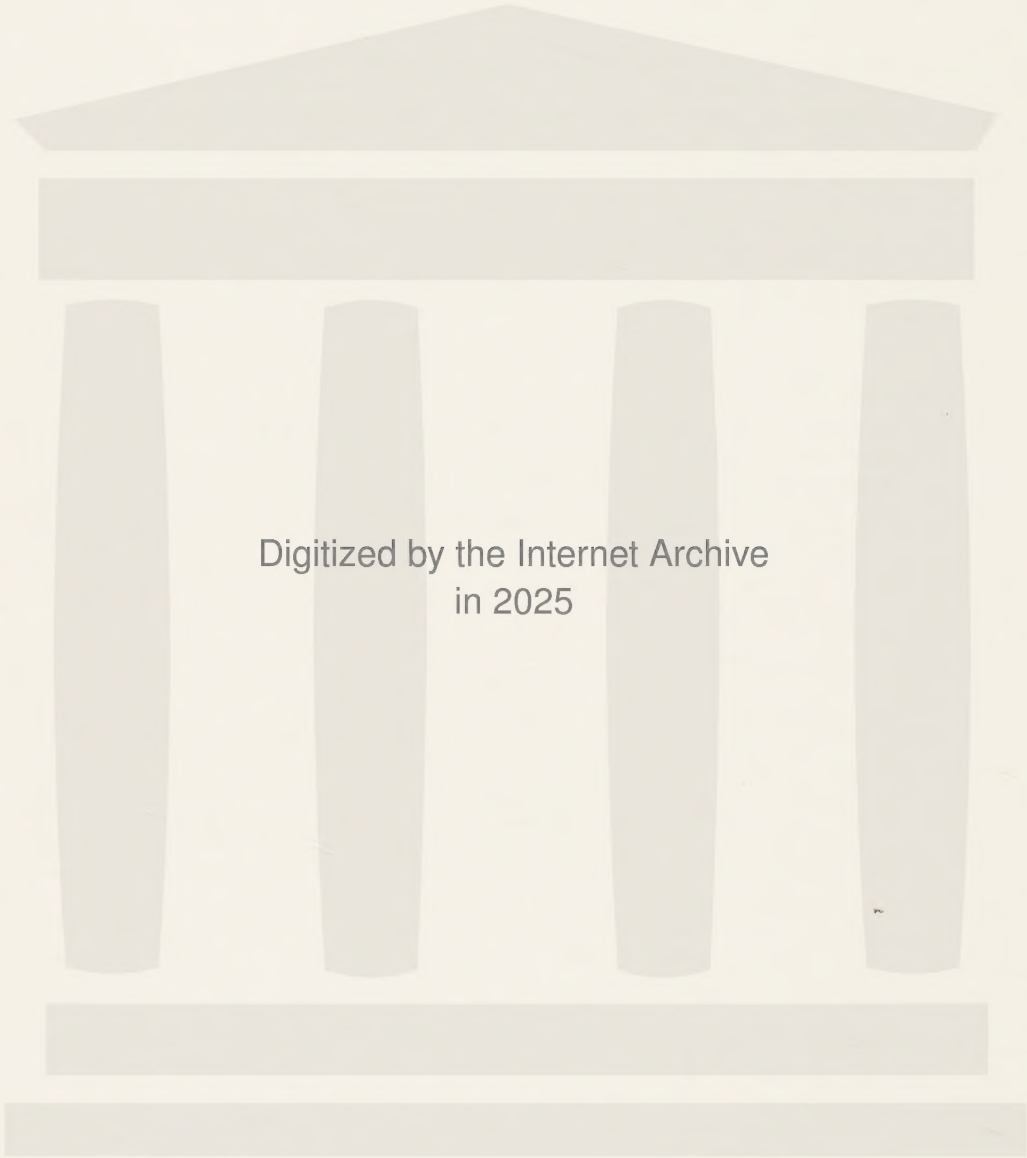
by

Edwin S. Iversen, Andrew E. Jones and C. P. Idyll

This work was financed by the Bureau of Commercial Fisheries under Contract Nos. 14-17-008-7 and 14-17-008-23, with funds made available under the Act of July 1, 1954 (68 Stat. 376), commonly known as the Saltonstall-Kennedy Act.

United States Fish and Wildlife Service
Special Scientific Report--Fisheries No. 356

Washington, D. C.
August 1960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ABSTRACT

A study of the pink shrimp, *Penaeus duorarum*, on the Tortugas fishing grounds was undertaken during 1957 and 1958 to provide information on the nature of the relation between the size of shrimp and the depth of water where they occur, together with fleet concentrations and degree of discarding of small pink shrimp. The average carapace length of both male and female shrimp increased both with depth of water and with northerly distance from the Florida Keys. Small pink shrimp were most abundant from September 1957 through May 1958, appearing on the eastern and southeastern portion of the grounds, where the highest try net catches were made. The fleet concentrated there during December to June but was more widely distributed during the summer. Apparently, few small pink shrimp were discarded.

INTRODUCTION

THE FISHERY

The pink shrimp, *Penaeus duorarum*, supports valuable commercial fisheries off the south coast of Florida and the Campeche area of the Gulf of Mexico. This species is of recent economic importance, having been caught in large quantities only since 1950. Little is known of the details of its life history and much has to be learned before a rational conservation plan can be devised for the fishery. The present investigation has been one phase of a research program on the pink shrimp and its fishery on the Tortugas grounds off the southern end of Florida. The work was supported by a Saltonstall-Kennedy funds through the U. S. Bureau of Commercial Fisheries, Contracts Nos. 14-17-008-7 and 14-17-008-23.

The Tortugas shrimping grounds (fig. 1) are roughly rectangular in shape, about 60 miles long (east and west) and 25 miles wide (north and south). The eastern corner of the grounds is located about 12 miles north-northwest of Key West, and the grounds extend past the Dry Tortugas Islands. The depth of water on the fishing grounds ranges in a gradual gradient from about 9 fathoms on the east to about 25 fathoms on the west, with most fishing taking place in depths from 11 to 19 fathoms. The bottom is mostly white sand and mud. Some outcroppings of rock occur, especially in shallow extension of

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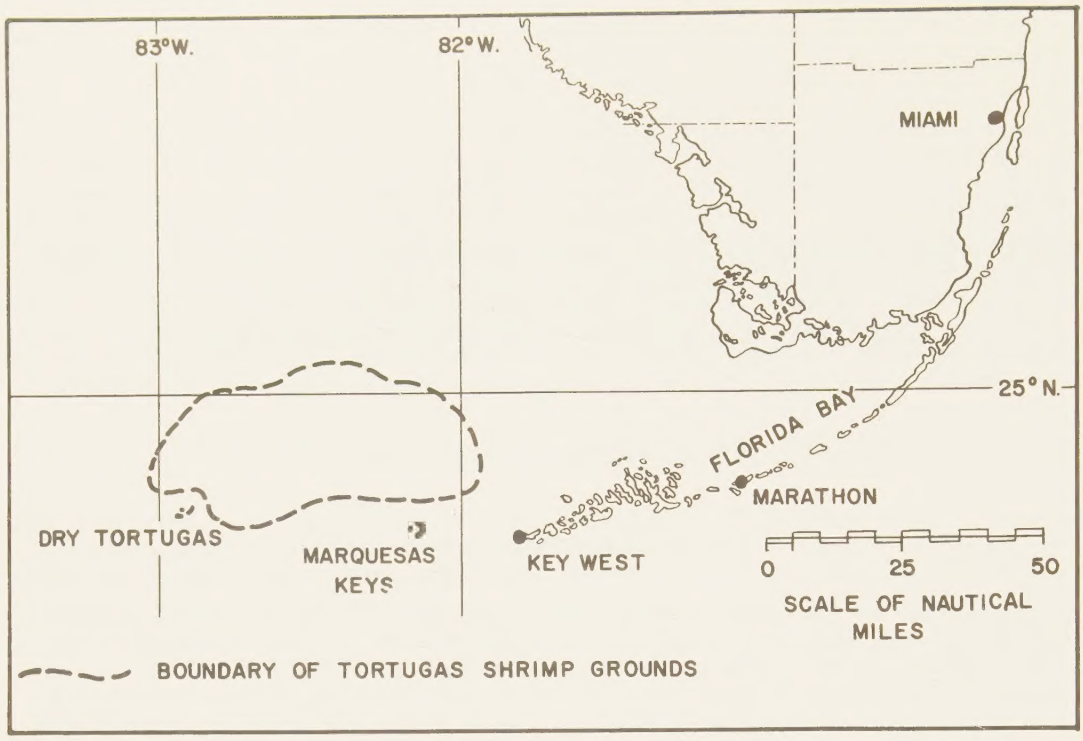

Figure 1.--Map of south Florida showing the Tortugas fishing grounds.

the Keys from Key West to the Dry Tortugas. Although shrimp occur outside the regularly fished area, fishing is difficult and hazardous because of the presence of loggerhead sponges, coral, and other obstructions. Small clear areas are to be found in the outside regions and these are occasionally trawled with the aid of a lighted buoy set out by the fishermen.

The exploitation of the Tortugas shrimp population developed rapidly, drawing boats from older grounds in Florida and from many other southeastern and Gulf States. By 1951, the landings were over 19 million pounds (heads on) and approximately this quantity has been landed in each succeeding year, except 1952, when only 11 million pounds were landed. The catch has thus been maintained over 9 years of the fishery. This does not suggest that overexploitation has occurred, but some persons in the industry are certain that the catch has been maintained only as a consequence of a great increase in fishing effort coupled with the use of small sizes of shrimp which were formerly discarded. Information on the sizes discarded or kept is difficult to obtain, but there is a greater tendency for buyers to accept small shrimp in recent years.

PURPOSES OF THE STUDY

The principal purpose of this study was to investigate the relation between the size of shrimp and the depth of water where they occur. Fishermen's observations and research data suggested that pink shrimp on the Tortugas grounds increase in size as water depth increases, but details of this relationship were lacking. A second purpose was to investigate the extent to which fishermen discard small shrimp. A wide range of sizes of shrimp are caught in the trawl nets. The smallest sizes are often thrown overboard with the unusable part of the catch, and the extent to which discarding is done is of importance to an understanding of the fishery. A third purpose was to study the distribution of fishing vessels on the grounds to determine whether effort was concentrated in certain areas, and whether seasons, weather, occurrence of seaweed and jellyfish, or other factors influence the distribution of fishing.

The present report summarizes the results of 13 months' field observations. Several factors, such as weather, markets, season, and size of boats, were expected to affect the results of this research. As the work progressed, other factors, unsuspected originally, were shown to influence the size-depth relationship and the distribution of fishing effort. In the following analysis the effect of the important variables on the results is described, and where possible measured. The results are then presented, and their significance in relation to the management of the fishery is discussed. These data cover a single year, and one that was not altogether "typical." The temperatures of southern Florida during the winter of 1957-58 were extremely low, and this may have had some effect on the behavior of the shrimp.

ACKNOWLEDGMENTS

Numerous people have contributed their services in the collection and analysis of the data presented in this report. U. S. Bureau of Commercial Fisheries personnel, D. Aldrich and E. Arnold; Marine Laboratory, University of Miami personnel, W. Cummings, A. Volpe, J. O'Neill, R. Manning, J. Vogel, D. Marra, J. Tweedy, H. Foulk, J. Iversen, W. Saenz, and A. C. Jones are due thanks. Dr. George A. Rounsefell and members of his staff reviewed the manuscript and provided helpful suggestions.

METHODS AND MATERIALS

VESSELS AND GEAR

Data were gathered from catches made by chartered commercial shrimp trawlers and from observations made from airplane flights over the grounds. The boats used, the *Captain Mack,* the *Danny Boy,* and the *Joanie,* are typical "Florida-type" shrimp trawlers. They are 63, 55, and 69 feet in length, respectively. The *Captain Mack* was used from September 1957 to mid-April 1958 (table 1). She was then sold and the *Danny Boy* secured and used until late September 1958, when she was accidentally rammed and capsized. The last two cruises were made on the *Joanie.*

During the first six cruises positions were determined by the radio direction finder on the chartered vessel. A small portable direction finder was also acquired for use in case of the failure of the vessel's instrument. During subsequent cruises the dead-reckoning navigation was improved by the use of a portable pelorus for obtaining more accurate visual fixes on navigation aids. Positions on the northern portion of the area were difficult to locate accurately, owing to the geographical location of the radio stations. After cruise 10 celestial navigation was used to supplement the radio direction finder since fishing is carried on at night.

Depths were determined chiefly by use of a fathometer. During the first several cruises depths were checked by leadline soundings and by bathythermograph lowerings, and the fathometer was repaired and checked to correspond. Fathometer tapes were marked and retained.

The gear employed in sampling consisted of standard commercial trawls, as described by Bullis (1951) and Knake, *et al.* (1958). On cruises 1-5 and 7-15, a 90-foot "two-seam flat" trawl was used. On cruise 6 a 90-foot balloon net was employed to avoid loss of the regular net on the rough bottom. On cruises 16-21, two 45-foot "double-rig" trawls were used; and on cruises 22 and 23, two 50-foot double-rig trawls. In addition to the big trawls described above, 15-foot try nets were used regularly. On some tows of cruises 1-11 a large try net, measuring about 30 feet, was used in place of the main trawl. Descriptions of all nets used on the various cruises are given in table 1.

The research plan provided for two cruises each month, starting in November 1957 and ending in November 1958. (Two preliminary cruises were made during September 1957 by Bureau of Commercial Fisheries scientists.) This plan was accomplished in all months except June, October, and November 1958 (in which one cruise was made each month) despite the unusually bad weather experienced during the study period. A total of 23 cruises was made. Sampling stations are depicted in figure 2. Fishing was done at night and tows were ordinarily limited to 1 hour instead of the usual 3 hours made by fishermen.

Table 1.--Details of sampling cruises

Cruise number	Dates	Vessel	Cod end mesh size (Inside stretched measure)	
			Main net (inches)	Try net (inches)
	1957			
I	Sept. 18-21	*Capt. Mack* (single rig)	1 3/4	1 3/4
II	23-25	do.	1 3/4	1 3/4
1	Nov. 5-7	do.	1 1/4	1 3/4
2	23-26	do.	1 1/4	1 3/4
3	Dec. 17-20	do.	1 1/4	1 3/4
4	27-30	do.	1 1/4	1 3/4
	1958			
5	Jan. 14-16	do.	1 1/4	1 3/4
6	28-30	do.	1 5/8	1 3/4
7	Feb. 17-20	do.	1 3/4	1 3/4
8	25-27	do.	1 3/4	1 3/4
9	Mar. 10-13	do.	1 3/4	1 3/4
10	25-28	do.	1 3/4	1 3/4
11	Apr. 7-10	do.	1 3/4	1 3/4
12	22-25	*Danny Boy* (single rig)	[1] 1 7/8	1 7/8
13	May 6-10	do.	1 3/4	1 7/8
14	22-25	do.	1 3/4	1 7/8
15	June 9-11	do.	[1] 1 3/4	1 7/8
16	July 16-19	(double rig)	1 7/16	1 7/8
17	24-27	do.	1 7/8	1 7/8
18	Aug. 5-8	do.	1 7/8	1 7/8
19	22-25	do.	1 7/8	1 7/8
20	Sept. 8-12	do.	1 7/8	1 7/8
21	23-27	do.	1 7/8	1 7/8
22	Oct. 17-19	*Joanie* (double rig)	1 5/8 & 1 5/8 liner	1 5/8 & 1 5/8 liner
23	Nov. 4-7	do.	1 5/8 & 1 5/8 liner	1 5/8 & 1 5/8 liner

1/ Tow 1 - 1 7/8" mesh with 1 7/8 liner.

Note: On cruises 1, 3, 6, 8 and 9 large try net of 1 3/4" mesh was used on some tows (see Appendix).

When the big trawl was retrieved the catch was dumped on deck. The large items, including sponges and big fish, were removed. The remaining catch, including shrimp and small fish, was mixed with a shovel and a sample taken for study. A constant sample size would have been desirable, for statistical analysis, but was not feasible. The number of shrimp in these samples varied from about 40 to about 200. These shrimp were sexed and measured to the nearest 0.1 mm. carapace length. This measurement was from the postorbital notch to the posterior edge of the carapace. "Size" of shrimp hereafter refers to this carapace length. Appendix table 3 shows the relation between carapace length, total length, and weight of female shrimp.

Shrimp taken in try-net hauls were measured if more than 20 but fewer than 100 were caught. If fewer than 20 were caught, they were not measured, but were counted and sexed. To determine relative abundance of shrimp, counts were made

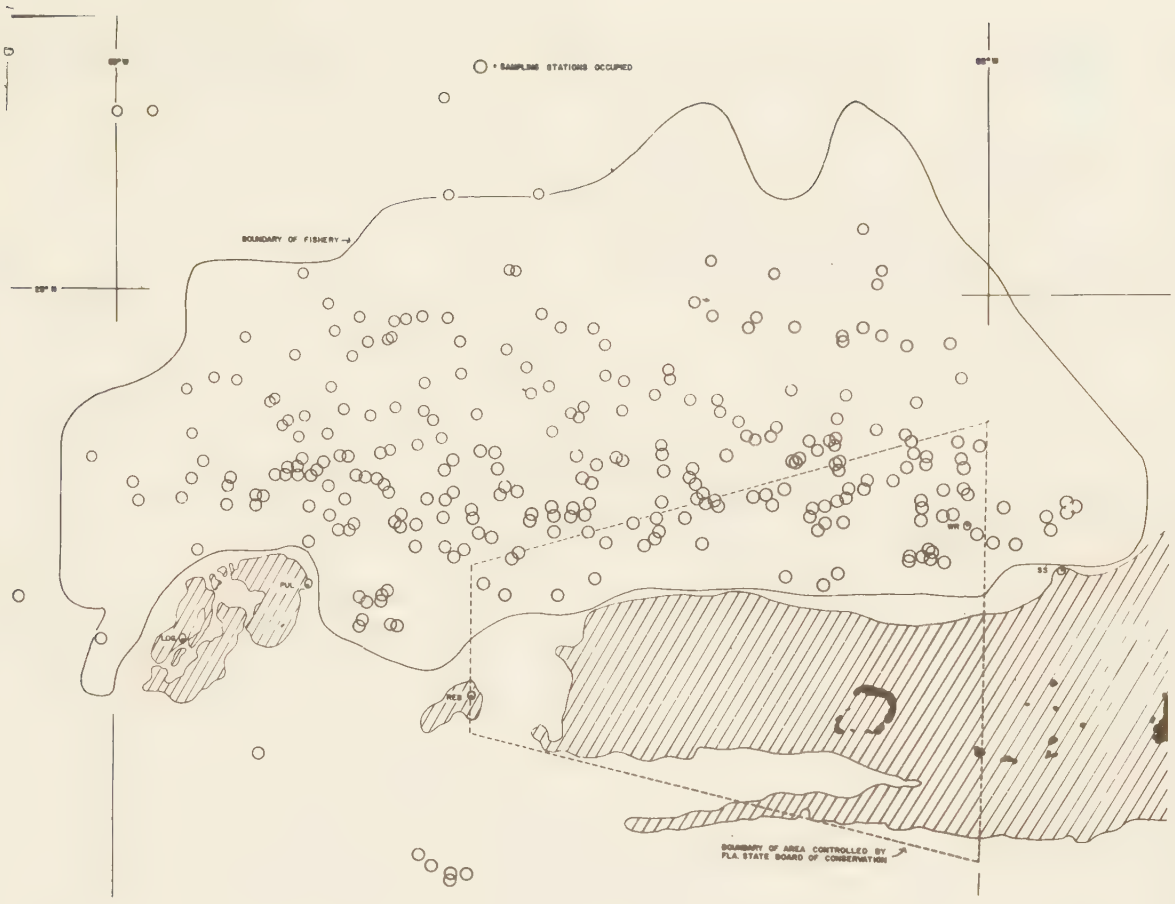

Figure 2.--Important features of Tortugas grounds, State controlled area, and boundary of fishery stations occupied.

of the numbers of shrimp caught in standard try-net tows. These estimates were begun with cruise 7.

OBSERVATIONS ON FLEET ACTIVITY

The fleet concentration has been expressed in terms of the number of boats fishing in a given area. This information was obtained by counting boats seen from the charter vessel on each trip and from airplane flights over the grounds. Counts of vessels from the charter boat were made at the time each drag commenced. Boats within sight were counted from each side of the vessel. This routine was carried out in cruises 1-7. After cruise 7 a different method was employed, the boats being counted in various sectors at any time during the tow. The size of the angle comprising a sector varied depending on the number and grouping of boats visible. The number of boats seen was plotted on a chart. As much care as possible was taken to avoid counting a given boat more than once. Maximum range of visibility of boats is estimated to have been 8 miles. Fishing is done at night in this fishery and the boats were located by their lights. Out to a radius of about 3 miles the pattern of lights is clear enough to distinguish shrimp boats from other boats; beyond that distance the lights blend and possibly vessels other than shrimp boats were occasionally counted. Other than shrimpers there is little night traffic, and few false identifications were believed to have been made. On any given night only part of the shrimp grounds were covered by the research vessel, so that the total fleet was never observed at one time.

The aerial observations were made on flights out of Key West and Marathon. Flight patterns were arranged to allow observation of the entire grounds within 2 hours. A single-engine airplane was used without floats, and the pilots were understandably reluctant to fly far from landing fields at night. Hence flights could

only be made when conditions were favorable, and only seven flights were made. Boat lights were counted by two observers on opposite sides of the plane using hand counters. The flight pattern was arranged so that overlap in counts was minimized. Boats tied up at docks in Key West and Marathon were also counted during the flights. Complete counts of the boats in the fishery each night of the flight were obtained in this manner.

SHRIMP DISCARDS

Observations of the amount of shrimp discarded were made from the charter vessels, from fishermen's logbooks, and at heading houses. Little discarding was done by the fleet during the period of observation since virtually all sizes caught could be sold. However, some shrimp are always thrown back; for example, damaged shrimp and shrimp that have recently molted are commonly discarded but are usually not abundant. "No" discarding (meaning no conscious rejection of pink shrimp of any size except damaged individuals) was done from the charter vessels from about February through August. Before and after this period some of the smaller sizes were thrown away. When this occurred, unselected samples were taken and the whole shrimp were recovered, counted, and measured. In addition, a sample of the heads of the shrimp kept by the crew were recovered, counted, and measured. This permitted an estimate of the total amount of shrimp discarded from the total catch. Occasionally a correction had to be made, to allow for part of the catch which was iced down without being headed. This occurred when the catch was so large that time was not taken for heading, or if the shrimp were so small as to make heading tedious.

Two circumstances reduced the usefulness of data on discards from the charter vessels. In the first place the captain of the *Captain Mack* and later of the *Danny Boy* had a market for small shrimp to be used for fish bait, a market which was not available to most others. Perhaps, as a consequence of this, he kept smaller shrimp than usual. Secondly, the hauls made by the charter boats were of shorter duration than usual in commercial practice, resulting in smaller catches, which may have affected discarding practices. Hence the data on discards may provide only estimated maximum and minimum discard sizes.

TREATMENT OF DATA

Size Distribution of Shrimp

Female pink shrimp are larger than the males and a sample containing both sexes produces a bimodal size distribution. The sex ratio in the total samples approximates 1:1, but there is considerable variation in the sex ratio among shrimp taken in individual samples. Consideration was therefore given to the use of only the females in calculating mean sizes of shrimp found on the fishing grounds. This would, of course, describe only half the population, but if the sizes of both sexes have a linear relation, description of the distribution of one sex will provide an approximation of the size distribution of the other sex. The average sizes of males and females of all samples of 30 or more shrimp of each sex are plotted in figure 3. All sizes and all depths sampled are included. The figure shows that there is a linear relation between the sizes of the two sexes. Hence the average size of females was selected to illustrate the size distribution of shrimp on the fishing grounds. For comparison four diagrams were constructed using male shrimp only.

Sampling Variation from Single and Double Nets

While this study was under way the shrimp fleet, and also the chartered vessel, was in the process of changing from the use of a single trawl to a double rig. To determine whether this had an effect on the sampling, the variation of mean lengths and sex ratios of shrimp among samples was analyzed. This also presented an opportunity to check the trawl as a sampling device.

Repeated samples were taken from a single catch. During cruise 16, the catch from tow 10 was sampled three times and during cruise 17, the catch from tow 8 was sampled four times. The average carapace length of males, of females, and of sexes combined are recorded in table 2. The numbers of individuals measured and the sex ratios are shown for each sample.

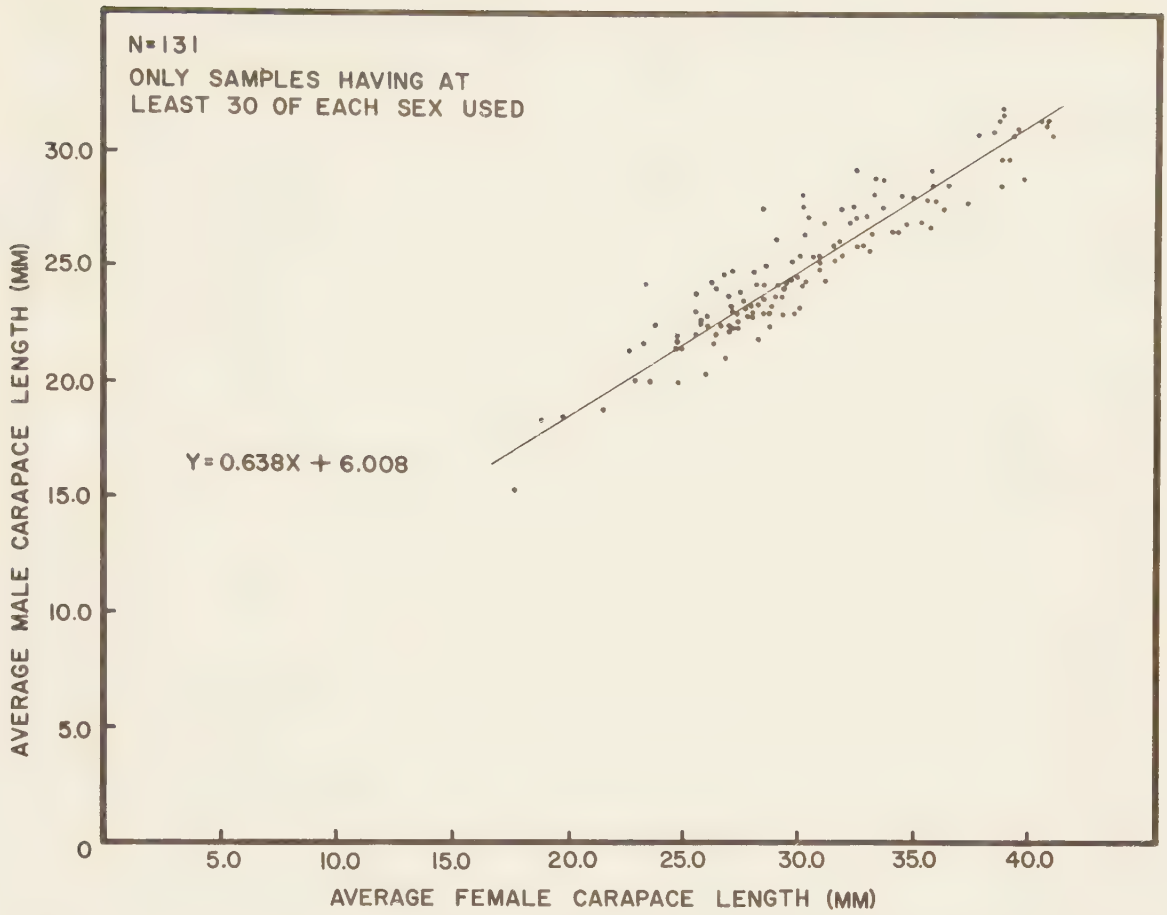

Figure 3.--Relationship of average carapace lengths of male and female pink shrimp, September 1957-November 1958.

Table 2.--Mean lengths of carapace and percentage of females in samples taken from a single catch

Cruise	Tow	Sample	Mean carapace length			Numbers		
			Males	Females	Both sexes	Males	Females	Percent females
16	10	1	23.4	29.0	26.2	32	32	50.0
16	10	2	23.7	29.1	26.5	27	30	52.6
16	10	3	23.4	29.5	26.6	48	52	52.0
16	10	4	--	--	--	24	63	72.4
16	10	5	--	--	--	35	42	54.5
16	10	6	--	--	--	27	30	52.6
16	10	7	--	--	--	34	33	49.3
17	8	1	22.4	27.4	25.0	62	70	53.0
17	8	2	22.5	27.2	24.8	101	95	48.5
17	8	3	22.5	26.7	24.6	83	89	51.7
17	8	4	22.0	26.4	24.4	76	97	56.1

The mean lengths show little variation and indicate that the sampling technique provided a representative index of the sizes in the catch.

Catches of nets from 10 tows of cruise 16 were examined to discover whether they differed in respect to the average size of the shrimp and to the sex ratio (table 3). Carapace length differences of male and female shrimp combined, from port and starboard nets, did not exceed 1.4 mm. within individual hauls. Neither net consistently caught the larger average shrimp. The variation in sex ratio of shrimp caught by the two nets was not extreme. These results justified pooling catches of the two nets before drawing the samples, or drawing them from either net.

Effect of Trawl Mesh Size

Ideally, the same trawl cod end should have been used throughout the study; however, trawl nets do not wear well and such a procedure was not possible. The nets used were bought as 2-inch stretched-mesh manufacturer's measure. Because of variations resulting from the manufacture, preservation, use, and other factors, trawl cod ends can vary greatly in average mesh size (Medico, 1958). This was evidenced in the present study. Cod-end meshes were measured at intervals for each shrimp net (table 1).

Graham (1956) found that the sizes of meshes in trawl cod ends govern the average size of the fish caught. This has also been shown for shrimp (Regan *et al.*, 1957) and it was considered necessary to determine how the different sizes of shrimp trawl cod ends might affect our results. The average size of female shrimp caught by the main nets was compared with the average size of female shrimp caught by try nets fishing simultaneously (fig. 4). At the top of the figure, sizes of shrimp in catches by a 1 3/4-inch mesh try net used for the first half of the study were compared with catches of two main net cod ends, one with 1 1/4-inch mesh and one with 1 3/4-inch mesh. The results suggest little influence by the meshes of these two nets on average female shrimp sizes.

In the lower part of figure 4, catches by a 1 7/8-inch mesh try net, used for most of the remaining time, are compared with catches of four main net cod ends, including the 1 3/4-inch mesh net used in the above analysis. The results indicate that the try net (1 7/8-inch mesh) caught a somewhat larger average size of shrimp than the main nets, but that the size selectivity of the nets did not materially affect the average size of female shrimp sampled.

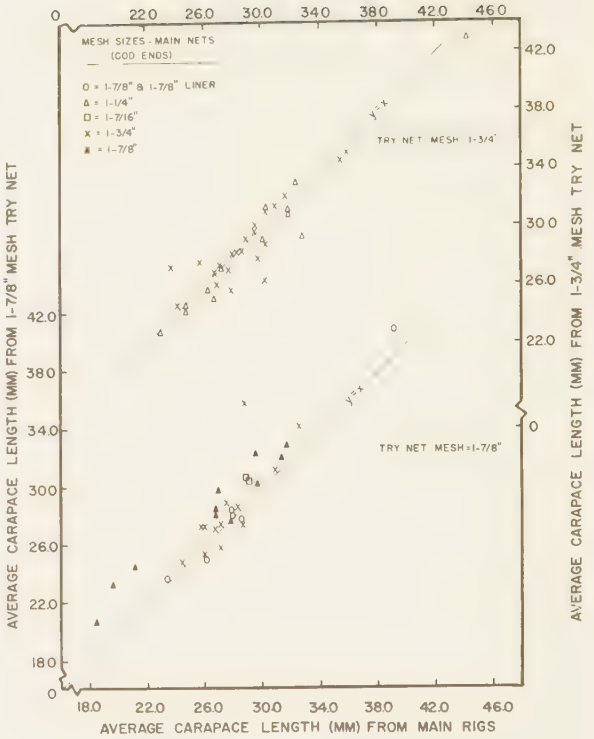

Figure 4.--Relationship of carapace length of pink shrimp caught by main nets and try nets.

Shrimp Size Isopleths

Several methods were considered for the analysis and presentation of the data describing the size distribution of shrimp on the fishing grounds. However, the data would not fully satisfy the requirements or assumptions of several statistical tests and the decision was therefore made to present the results graphically. Diagrams have been constructed showing the areas of the fishing grounds where shrimp of a certain size range occurred. Isopleth lines were drawn on charts of the fishing grounds, joining interpolated points from observed average size of female shrimp. Standard isopleths of 2.5 mm. head-length intervals were used, the smallest being 20.0 mm. Data from successive cruises

Table 3.--Mean carapace length by sex and by sexes combined and the percentage of females among samples taken from catches of two nets fishing simultaneously

1/ Tow number	Port net						Starboard net						2/ Difference	
	Mean carapace length			Number			Mean carapace length			Number				
	Male	Female	Both sexes	Male	Female	Percent female	Male	Female	Both sexes	Male	Female	Percent female	3/ Carapace length	Percent female
1	24.2	28.3	26.4	71	84	54.2	24.7	29.8	27.6	58	77	52.0	-1.2	+2.2
2	28.6	36.5	32.3	53	47	47.0	28.8	35.0	31.8	52	48	48.0	+0.5	-1.0
4/ 3														
4	28.9	37.8	32.4	43	28	39.4	28.8	39.5	32.8	50	30	38.6	-0.4	+0.8
5	29.1	40.3	32.7	62	30	32.6	29.2	38.8	32.6	53	25	32.1	+0.1	+0.5
6	27.0	34.9	29.6	26	13	33.4	26.9	36.0	31.0	32	26	44.8	-1.4	-11.4
7	24.9	29.7	27.9	30	49	62.1	24.3	30.5	28.2	41	67	62.0	-0.3	+0.1
8	23.2	31.8	30.0	5	29	85.4	23.5	30.6	29.2	10	39	79.6	+0.8	+5.8
9	24.1	28.3	26.2	57	54	48.6	24.7	28.3	26.3	56	46	45.1	-0.1	+3.5
10	24.6	28.8	26.9	54	64	54.2	23.4	29.0	26.2	32	32	50.0	+0.7	+4.2
11	23.6	29.1	26.6	37	45	54.9	22.7	28.1	25.9	37	53	58.9	+0.7	-4.0

1/ All tows from Cruise 16.
2/ Using port net as standard.
3/ Differences between the average carapace length of shrimp sampled from the starboard and port nets (sexes combined).
4/ Only a single net used in this tow.

with similar distribution of shrimp sizes were pooled. The diagrams were constructed from data presented in the appendix.

SEX RATIO

The sex ratios in each sample which had at least 30 of each sex showed no marked difference with changes in the size of female shrimp (fig. 5). The ranges of sex ratios for each cruise are shown in figure 6. The mean percentage of females varied considerably for each cruise, suggesting that either there is grouping by sexes on the grounds or our sampling induced variation, or both. There was an indication of fewer females in the catches from September to December, while during January there were more than 50 percent females; there were close to 60 percent females during July-September.

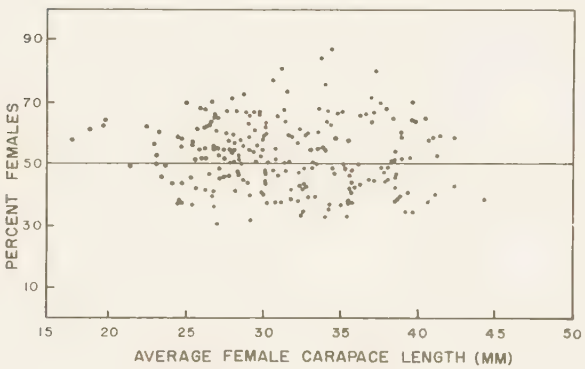

Figure 5.--The percentage of females by size of female shrimp.

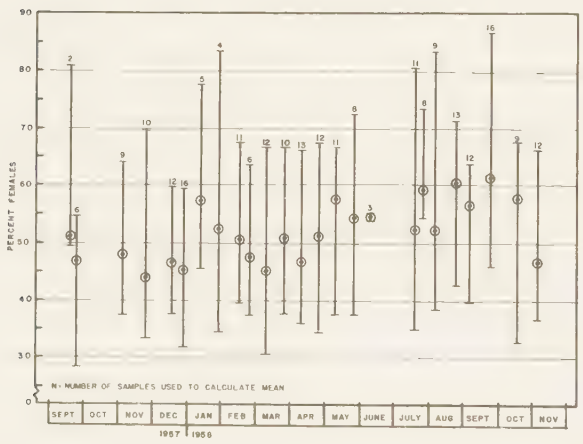

Figure 6.--The range and mean percentage of female pink shrimp in the catches, by months, September 1957-November 1958.

SIZE OF SHRIMP

DISTRIBUTION OF SHRIMP BY SIZE AND DEPTH

The average size of shrimp on the fishing grounds increases with depth. This relationship is illustrated by plotting the average sizes of all samples throughout the year against depth, keeping the sexes separate (figs. 7 and 8).

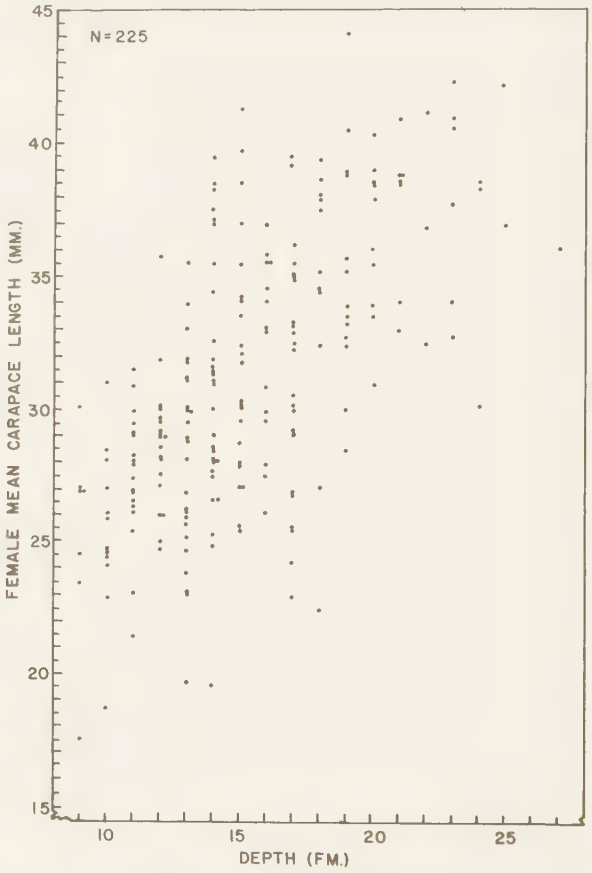

Figure 7.--Relationship of depth of water and average size of female shrimp.

In addition to separate treatment of data from males and females, the trend of the combined sexes is shown (fig. 9). The curve representing male data shows a slope of 0.618 mm. (Sd y·x = 0.752 mm.) for each fathom change in depth. The female shrimp show a more rapid increase in length of carapace with increase in depth, 0.868 mm. (Sd y·x = 1.16). The combined data provide an intermediate slope, 0.739 (Sd y·x = 0.881). Despite this relation between size of shrimp and depth,

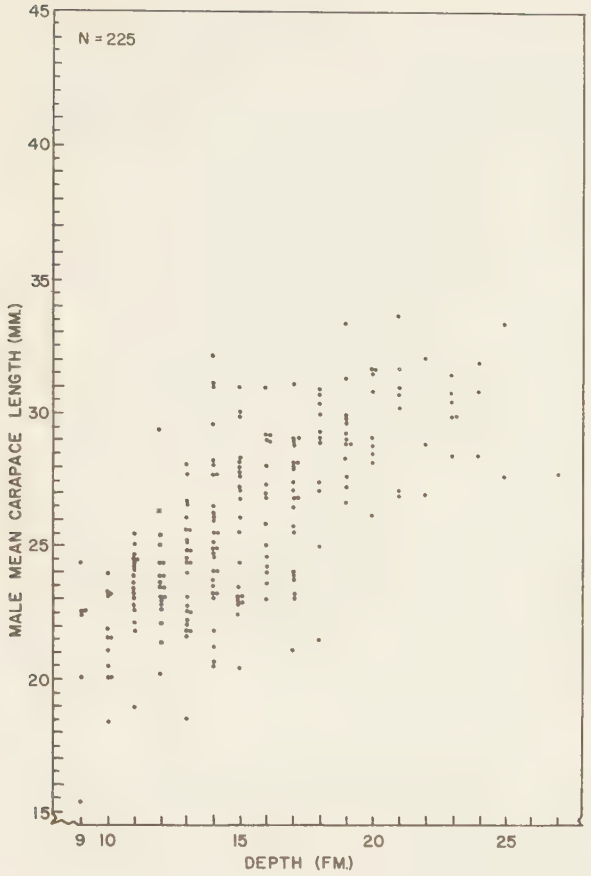

Figure 8.--Relationship of depth of water and average size of male shrimp.

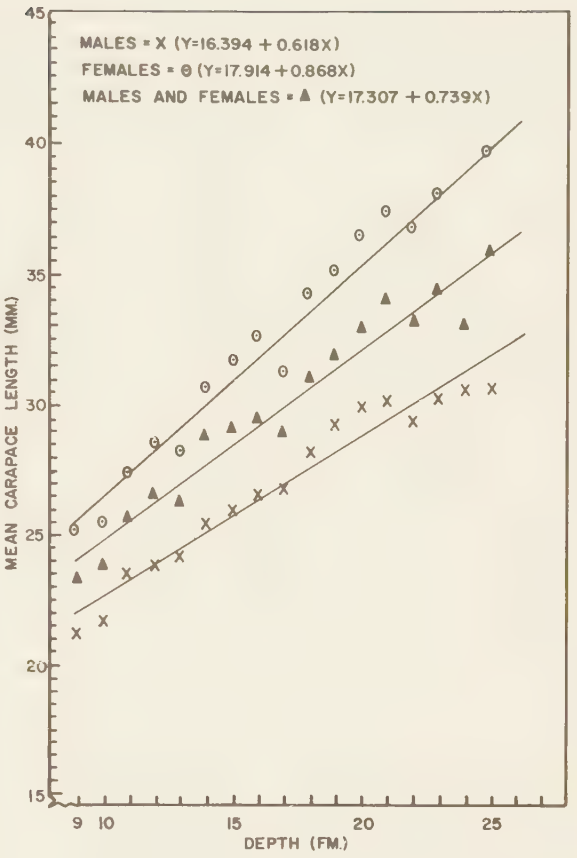

Figure 9.--Relationship of the annual average size of shrimp and depth of water.

there is a considerable range of sizes at all depths. Some important causes of this variation will be discussed in subsequent sections.

The following figures (10 to 13) contain data gathered on groups of cruises and these points should be noted:

1. The average size (carapace length) of shrimp on the grounds.

2. The distance between isopleths. When the standard isopleths are close together, the average size of shrimp is changing rapidly and conversely.

3. Direction of the gradient. When the isopleths are parallel over some distance on the grounds, a positive gradient exists.

Examination of these isopleths shows, with minor exceptions, that two patterns of size distribution predominate on the Tortugas grounds. One is the increased size with depth and the other a size gradient in a northerly direction irrespective of depth. Without complete coverage of the fishing grounds during each cruise, a complete evaluation of the significance of these two patterns is not feasible. We have shown in figures 7, 8, and 9 that a size-depth relation exists but we must consider that such a relationship may be a function of diffusion or dispersion of individuals from the Keys. Considering the number of cruises in which the resultant isopleth lines cross fathom contours, we strongly entertain this possibility.

These data suggest that small shrimp move onto the grounds from the east and southeast and increase in size as

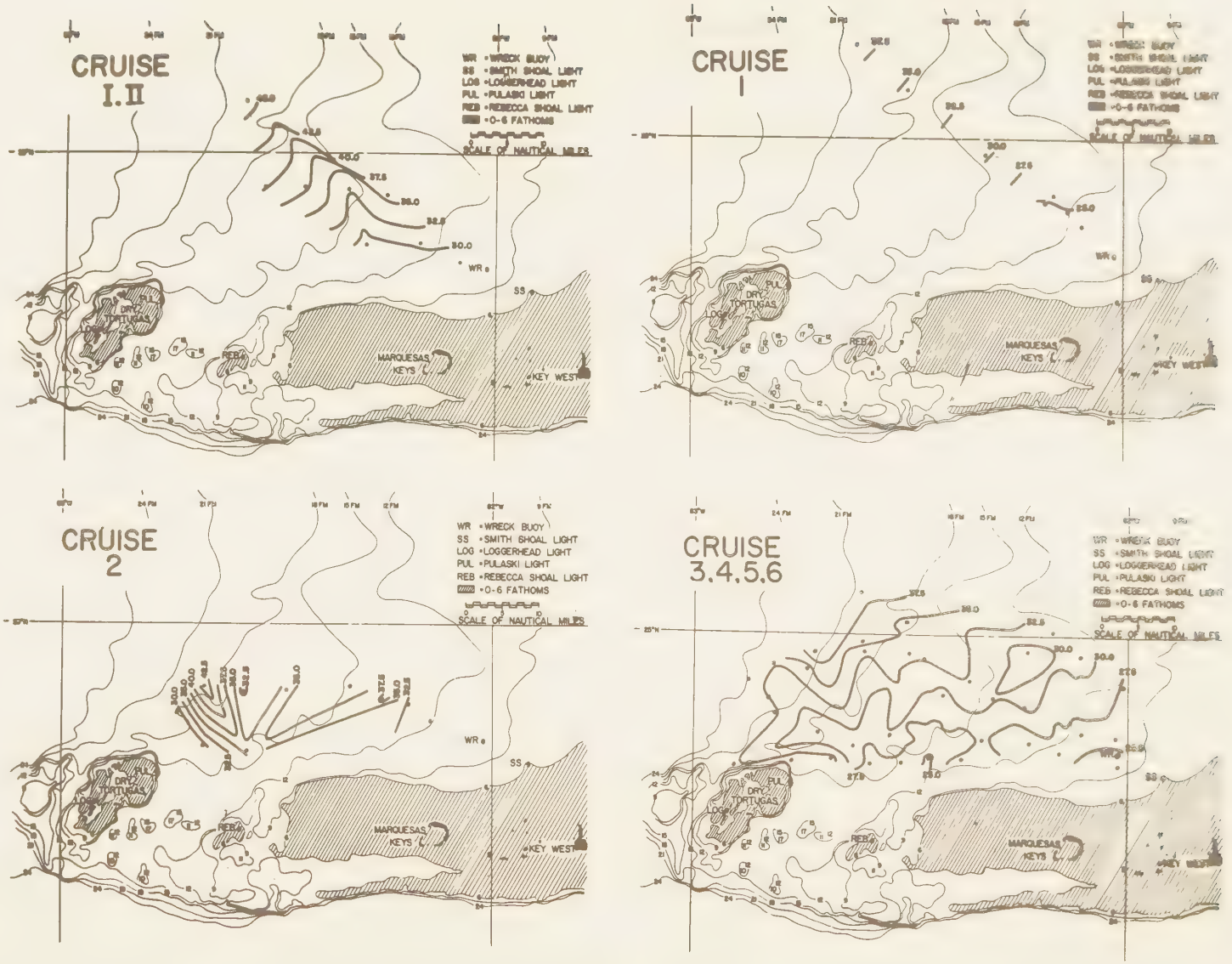

Figure 10.--Female shrimp size and depth (cruises I, II, 1-6).

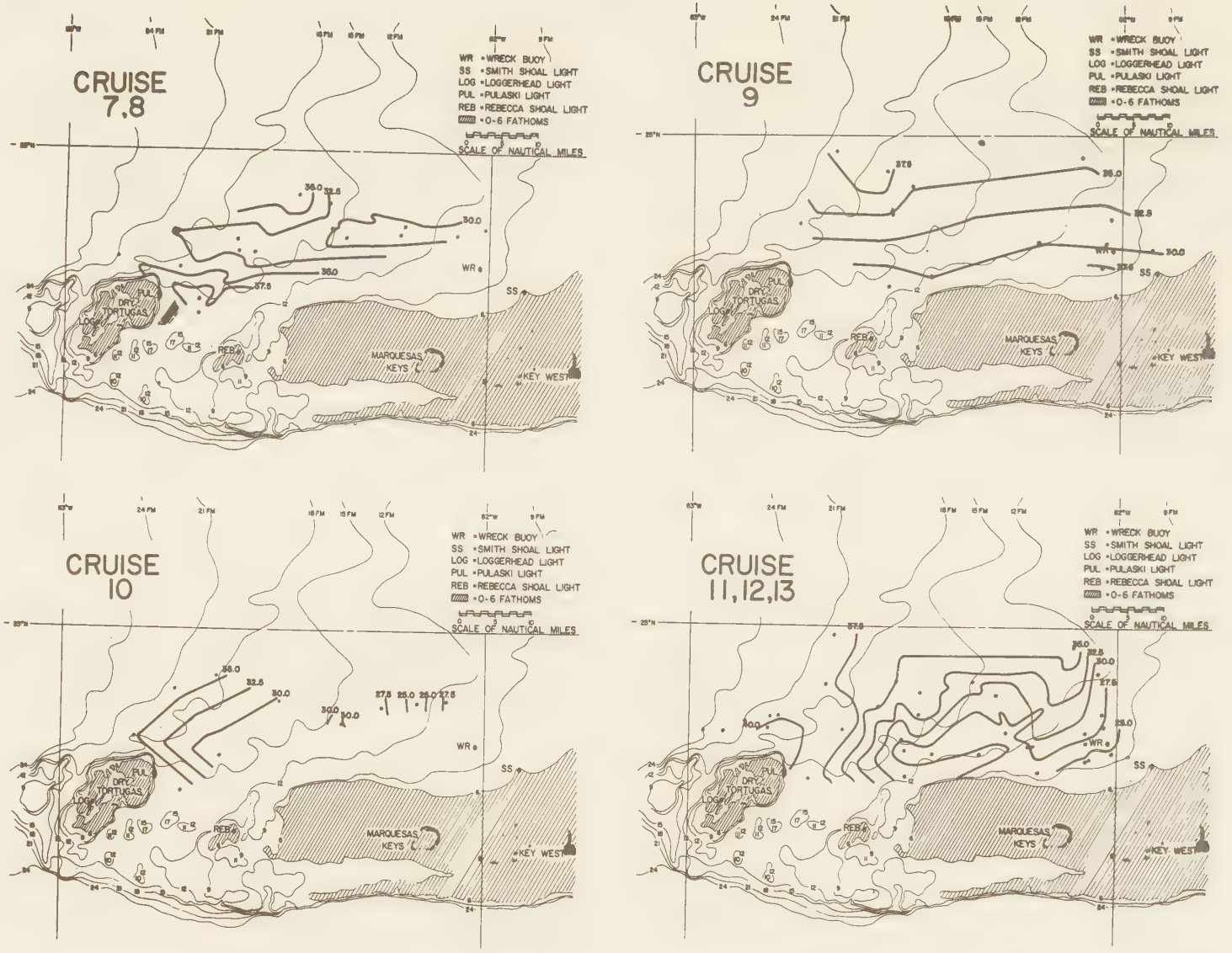

Figure 11.--Female shrimp size and depth (cruises 7-13).

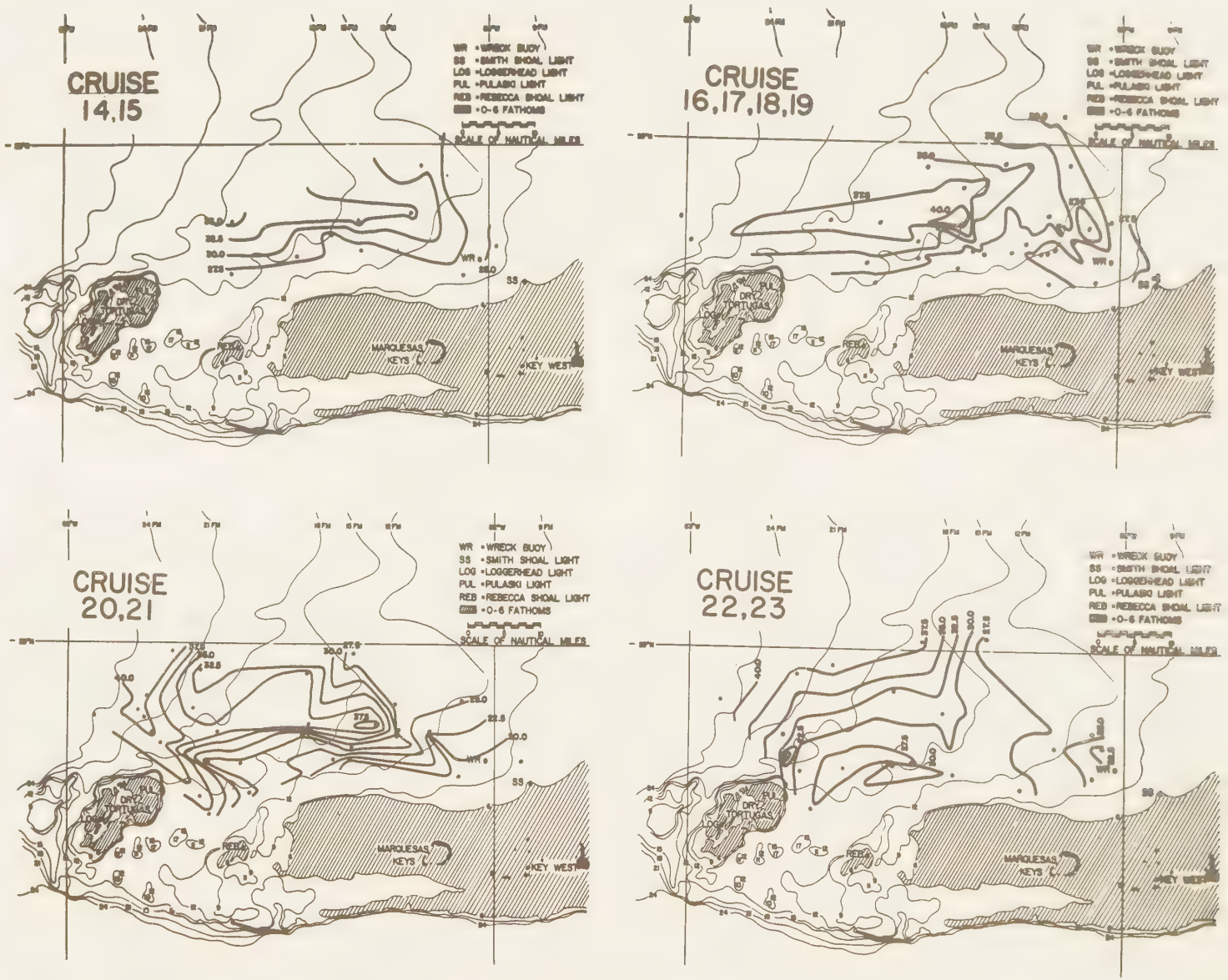

Figure 12.--Female shrimp size and depth (cruises 14-23).

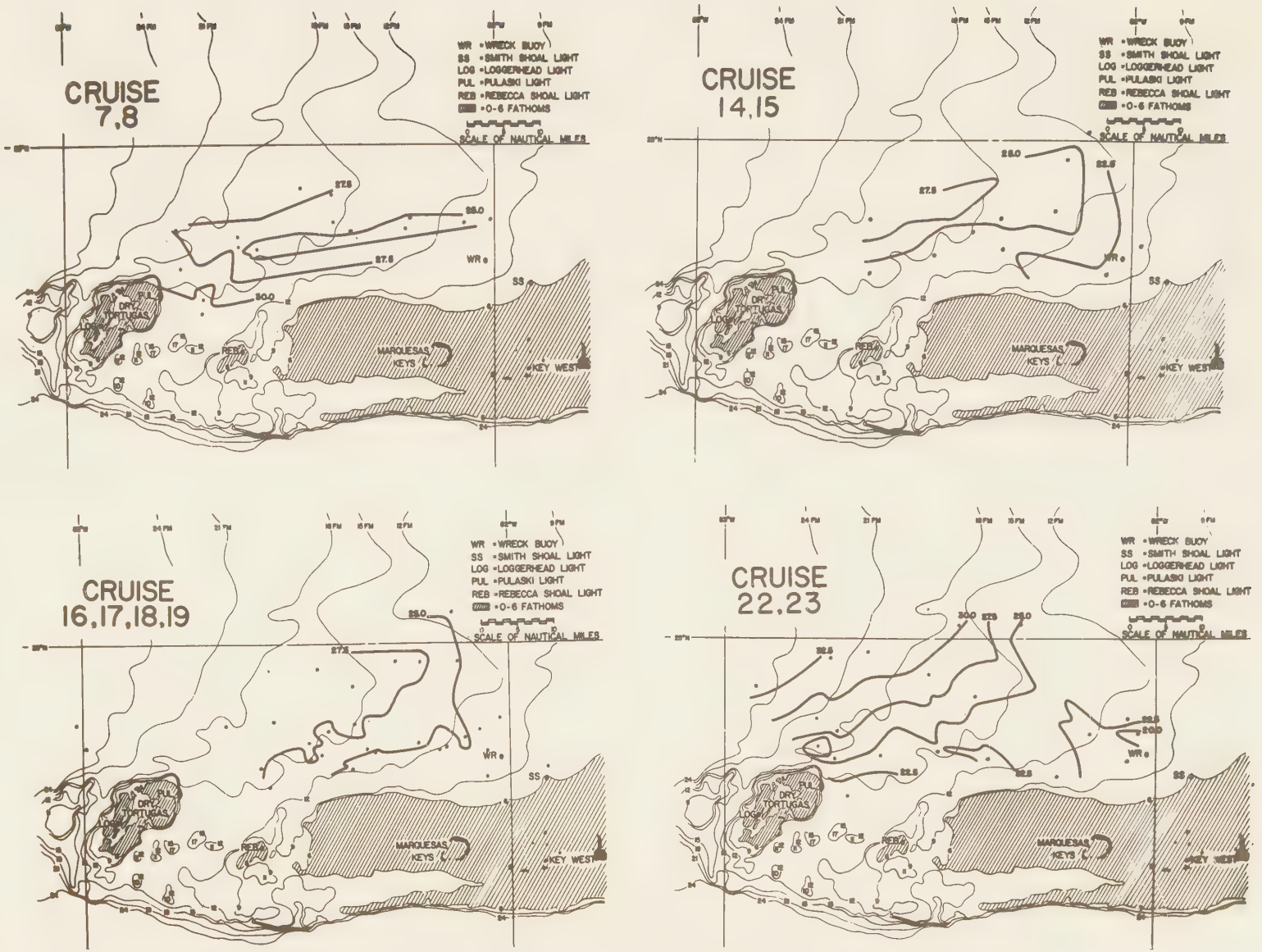

Figure 13.--Male shrimp size and depth (cruises 7-8, 14-19, and 22-23).

they move in either a northerly or northwesterly direction. There is no distinct seasonal pattern in the size-depth relation. Small shrimp predominate on the grounds during the months of September through May.

Using as an index of abundance the number of shrimp caught per hour in the standard try net, additional information on shrimp movements was obtained. Catches are charted on the following graphs, and the diameter of the circles denote the number of shrimp taken per try-net hour (figs. 14 to 16). The greatest abundance occurred from December 1957 to January 1958 and from March to June 1958. Catches during these periods were made in shallow water on the southern and eastern sectors of the grounds. This evidence indicates a period of recruitment during the winter, with shrimp entering the grounds from the south and east, much as was shown by the size-depth relation.

FLEET CONCENTRATIONS

Most of the data on fleet concentrations were obtained from observations made on the charter vessel. These observations were made on every cruise and hence are more complete than those made from airplanes. Airplane flights over the grounds at night provide spatial distribution and estimates of the total number of vessels trawling. Seven airplane flights were made (table 4, p. 21).

The number of boats observed from the charter vessel are totaled for 5-mile squares and are represented by symbols denoting the various concentrations (figs. 17-19). These figures can only be considered as rough estimates since the diagram for each cruise usually represents a total of three nights' observations. Boats moving from one location on the grounds to another during the cruise could have been missed altogether. Varying visibility on the fishing grounds also produces errors.

While observations on the distribution of fishing effort are incomplete, some general seasonal trends in fishing effort can be seen. During the period December to June the largest concentrations of vessels were observed and were located on the eastern and southeastern portions of the grounds. An exception to this occurred during October when concentrations of over 35 vessels per 5-mile square were noted on the southwestern portion of the grounds. During the remainder of the year the vessels generally covered the entire grounds, their distribution being restricted by the State conservation area and by the occurrence of algae.

The distribution of fleet concentrations agrees well with the abundance indices of pink shrimp in time and space. The largest catches of shrimp and the largest number of vessels were found on the eastern and southern portions of the grounds, and these values were also highest during the months from December to June.

SHRIMP DISCARDING

Since small shrimp bring a lower price than large shrimp, fishermen sometimes discard the small ones. This practice is important in the analysis of the fishery because shrimp which are caught and then discarded are not included in catch records. This lowers the catch per unit of effort of a vessel and introduces an error in the average size of shrimp caught. Estimates of discard in this study have come only from the research vessel for reasons discussed earlier. Observations were made on (1) the sizes of shrimp discarded compared to those retained, (2) the ratio of times fishermen discarded shrimp to the times that they did not discard shrimp, and (3) the possible influence of different size distributions causing fishermen to discard.

To obtain information on the sizes of shrimp discarded compared to those retained, heads from shrimp that had been retained and whole discarded shrimp were measured during five cruises (figure 20). When discarding occurred, virtually all shrimp as large as 19 mm. (smaller than 100 count, heads off) were discarded and about 80 percent of 22 mm. and about 60 percent of 25 mm. were discarded. Practically no shrimp larger than 28 mm. carapace length (60

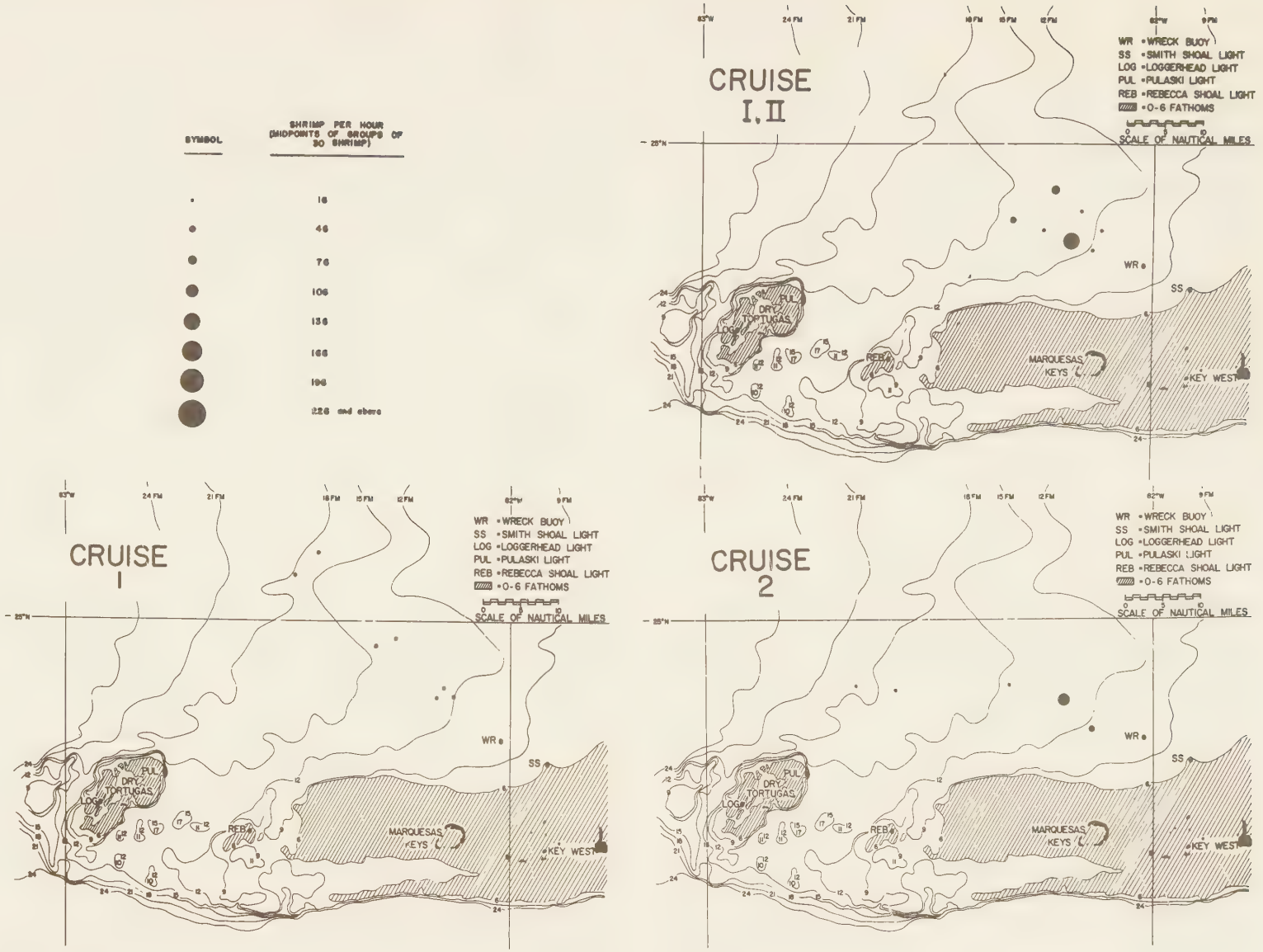

Figure 14.--Numbers of shrimp caught per hour in a standard try net (cruises I, II, 1, 2).

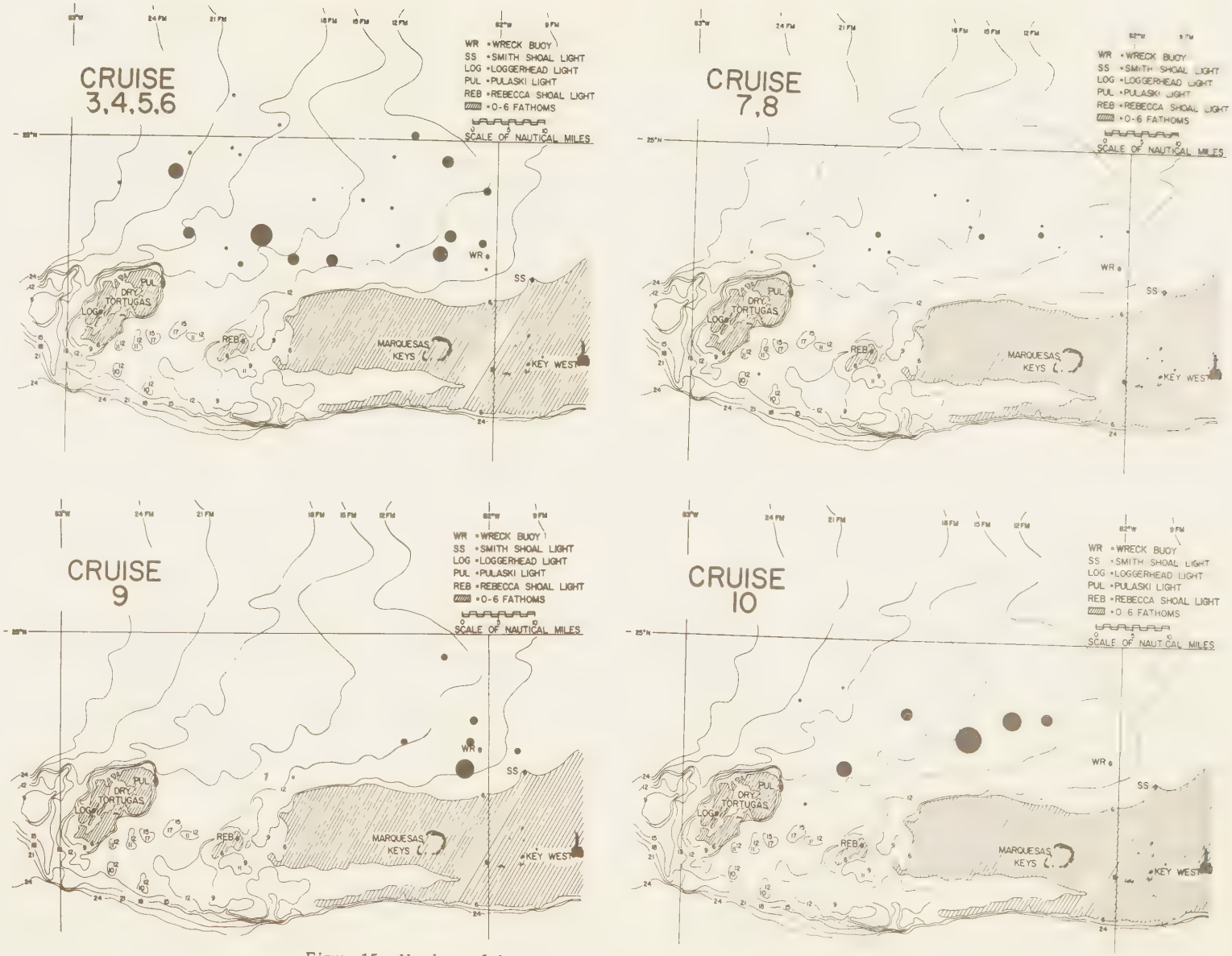

Figure 15.--Numbers of shrimp caught per hour in a standard try net (cruises 3-10).

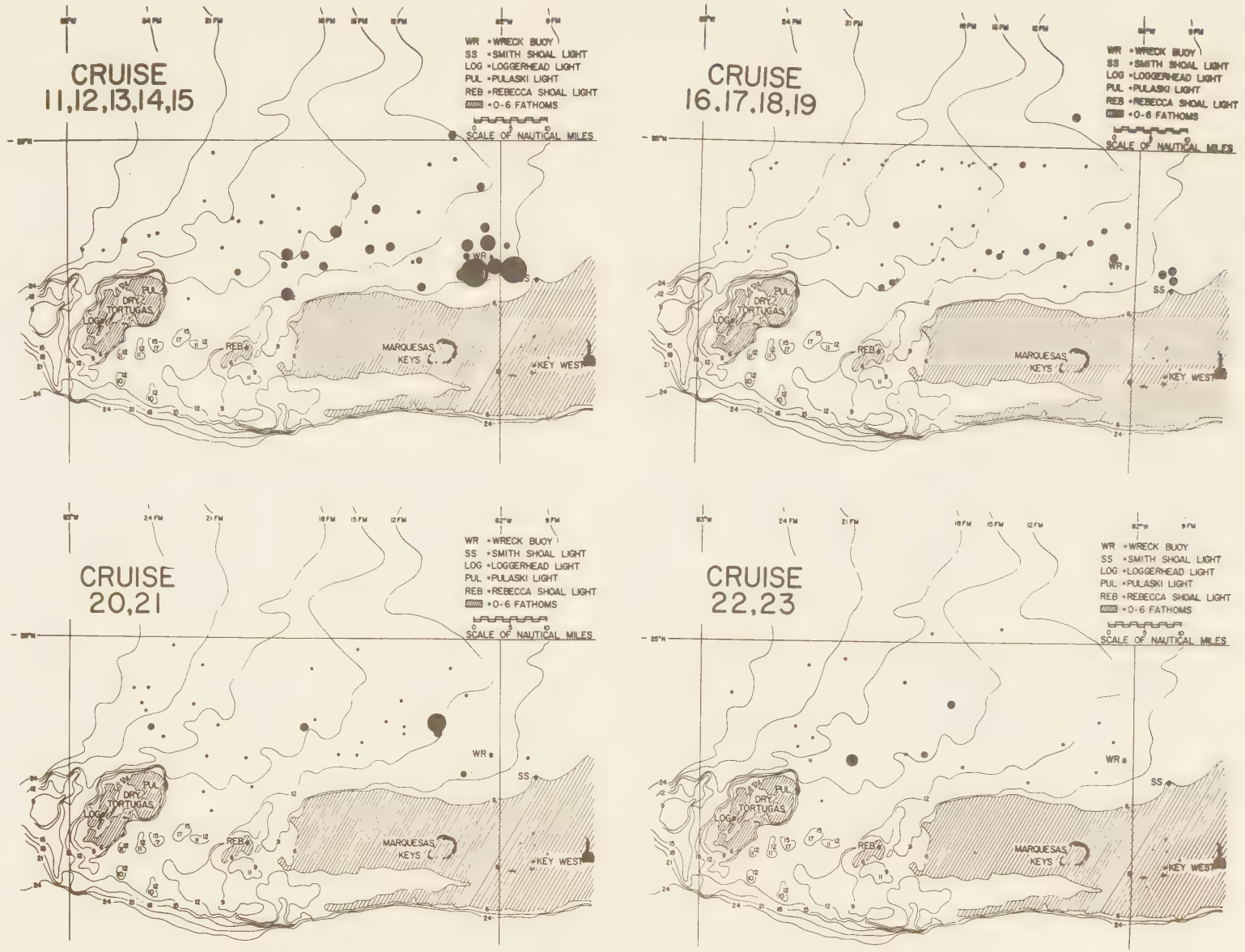

Figure 16.--Numbers of shrimp caught per hour in a standard try net (cruises 11-23).

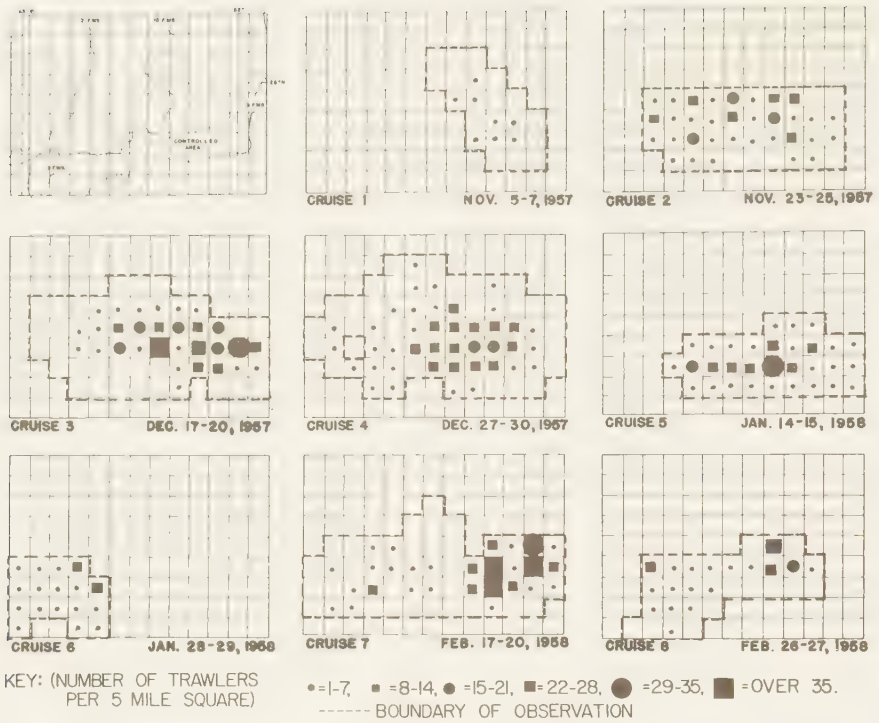
CRUISE 1 NOV. 5-7, 1957
CRUISE 2 NOV. 23-25, 1957
CRUISE 3 DEC. 17-20, 1957
CRUISE 4 DEC. 27-30, 1957
CRUISE 5 JAN. 14-15, 1958
CRUISE 6 JAN. 28-29, 1958
CRUISE 7 FEB. 17-20, 1958
CRUISE 8 FEB. 26-27, 1958
KEY: (NUMBER OF TRAWLERS PER 5 MILE SQUARE)
•=1-7, ■ =8-14, ● =15-21, ■=22-28, ● =29-35, ■ =OVER 35.
------ BOUNDARY OF OBSERVATION

Figure 17.--Distribution of fishing effort on the Tortugas grounds (November 1957-February 1958).

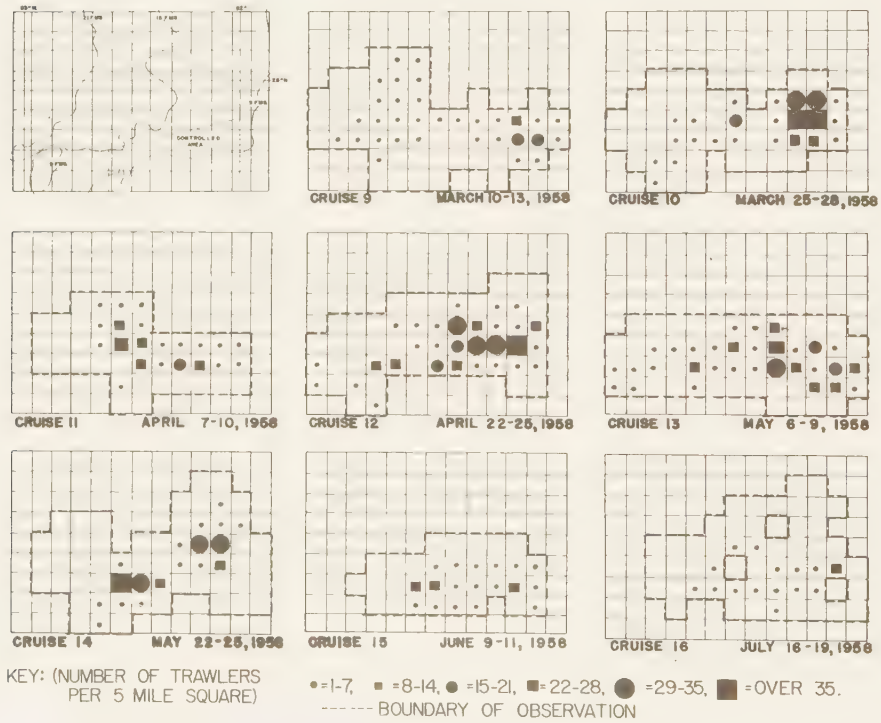
CRUISE 9 MARCH 10-13, 1958
CRUISE 10 MARCH 25-28, 1958
CRUISE 11 APRIL 7-10, 1958
CRUISE 12 APRIL 22-25, 1958
CRUISE 13 MAY 6-9, 1958
CRUISE 14 MAY 22-25, 1958
CRUISE 15 JUNE 9-11, 1958
CRUISE 16 JULY 16-19, 1958
KEY: (NUMBER OF TRAWLERS PER 5 MILE SQUARE)
•=1-7, ■ =8-14, ● =15-21, ■=22-28, ● =29-35, ■ =OVER 35.
------ BOUNDARY OF OBSERVATION

Figure 18.--Distribution of fishing effort on the Tortugas grounds (March-July 1958).

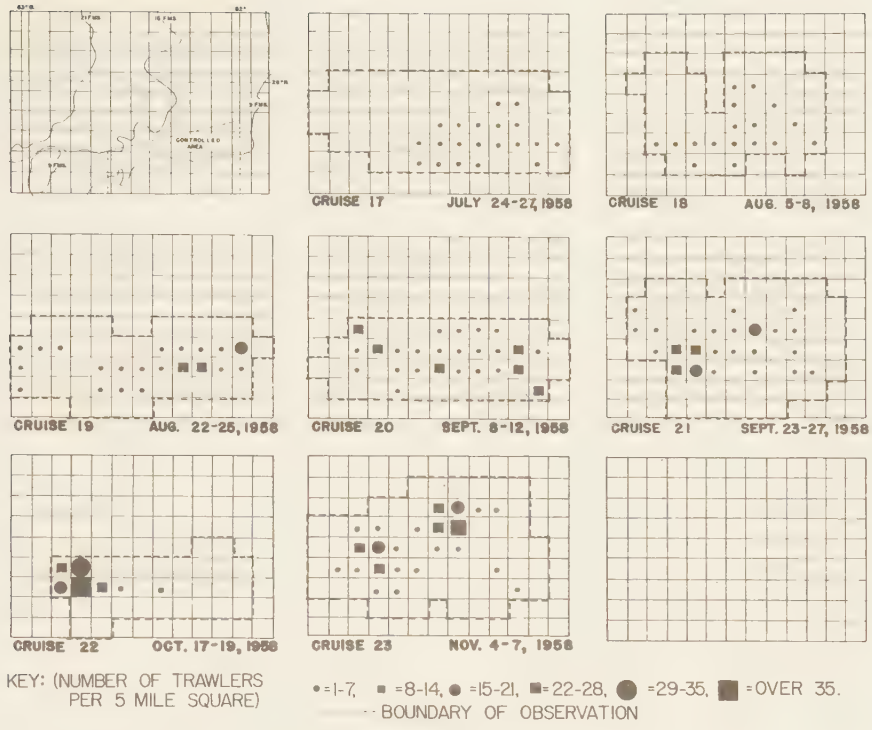
CONTROLLED AREA
CRUISE 17 JULY 24-27, 1958
CRUISE 18 AUG. 5-8, 1958
CRUISE 19 AUG. 22-25, 1958
CRUISE 20 SEPT. 8-12, 1958
CRUISE 21 SEPT. 23-27, 1958
CRUISE 22 OCT. 17-19, 1958
CRUISE 23 NOV. 4-7, 1958
KEY: (NUMBER OF TRAWLERS PER 5 MILE SQUARE)
•=1-7, ■=8-14, ●=15-21, ■=22-28, ●=29-35, ■=OVER 35.
BOUNDARY OF OBSERVATION

Figure 19.--Distribution of fishing effort on the Tortugas grounds (July-November 1958).

Table 4.--Number of vessels counted on the fishing grounds and at dock during airplane flights, January to November 1958

Flight	Date	Number of vessels		
		On grounds	At dock	Total
1	January 30	142	388	530
2	February 26	555	102	657
3	March 27	322	128	450
4	April 22	440	106	546
5	June 25	105	95	200
6	August 20	166	23	189
7	November 3	115	59	174

count, heads off) were discarded. On certain instances fishermen left small numbers of large shrimp, but these were merely overlooked and were not intentionally discarded. Some were also cast aside because they were crushed, or soft, having recently molted. From these data it appears that when discarding occurred, 26 mm. carapace length was the largest size normally discarded and that at about 20 mm. carapace length all shrimp were discarded.

The second aspect of this phase of the study was to determine how often discarding took place. Tows containing some shrimp of 26 mm. or less (i.e., sizes which are ordinarily discarded) were observed (table 5). On 23 tows the fishermen intentionally discarded small shrimp and on 177, they did not. The majority of these cruises for which discarding took place occurred during midwinter and fall. Table 5 also shows the range and mean percentages of tows

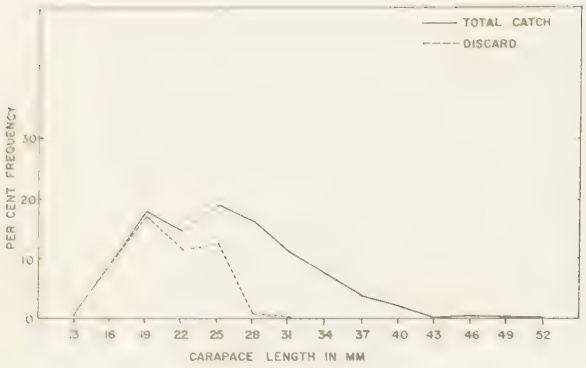

Figure 20.--Size frequency distribution of the total catch of pink shrimp and those discarded.

in which shrimp less than 26 mm. were discarded and not discarded. In discarding tows, the mean percentage (obtained by averaging the percentages of all samples) was higher (58.1 percent of shrimp were 26 mm. or less) than for the no-discard tows (33.7 percent). On some tows when no discarding took place, as high as 93 percent of the shrimp were 26 mm. or below.

When large numbers of small shrimp (under 26 mm.) first appeared on the grounds in September 1958, discarding occurred. When it became apparent that the small shrimp were in great abundance, they were retained. During the study period dealers indicated that all sizes of shrimp could be marketed. In September, samples taken from trash in two heading houses produced no whole discarded shrimp that were not soft or damaged. Average size of two samples were 22.9 mm. and 22.2 mm. carapace length, the smallest individuals measured about 18 mm.

During the period from June through November 1958, logbook reports from 14 boats indicate that very little discard took place. Data from approximately 645 tows (on the basis of three tows per night) show discard occurring on only 17 tows, for an estimated total weight of 138 pounds. Apparently small shrimp are discarded only when few are caught, and it is not worth the effort or expense to ice them separately from the rest of the catch.

Table 5.--Number of tows and size distributions from which shrimp were discarded and not discarded

Number	Percentage of shrimp 26 mm. or less	
	Range	Mean
	Discard Tows	
23	13-96	58.1
	No Discard Tows	
177	1-93	33.7

SUMMARY

1. This report contains observations on the relation between the size of Tortugas pink shrimp and the depth of water where they occur, on fleet concentrations on the grounds, and on the discards of small pink shrimp.

2. Data on these aspects were gathered from September 1957 to November 1958. Two cruises per month were made each month except June, October, and November 1958 to observe fleet activities and to collect samples of shrimp. Seven flights were made over the grounds to observe fleet concentrations. Additional information on fishing effort was obtained from logbooks.

3. The average carapace length of both male and female shrimp taken during the year increased with depth; however, a size gradient irrespective of depth was also apparent in a northerly direction from the Keys. Whether the size-depth relation was a function of seasonal dispersion of shrimp as they increased in size, could not be determined.

4. The small shrimp first occurred on the eastern and southeastern portions of the grounds. Small shrimp were most widely distributed on the grounds during September through May 1958.

5. The highest catches, based on try-net data, were made December 1957-January 1958, and during March to June 1958. The highest catches were made on the southern and eastern areas of the grounds, generally in shallow water.

6. During December to June the largest concentrations of vessels were located on the eastern and southern portions of the grounds. During the summer, the fleet was more widespread.

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APPENDIX

All tows from which samples of shrimp were obtained for the size-distribution study are listed in appendix table 1. Not all tows provided adequate samples of shrimp; where this was the case, no average carapace length is provided. During July and August 1958 (Cruises 16, 17, and 18), 28 tows were made with the try net to locate the eastern boundary of the recurrence of algae. These tows are not listed. Try net tows that were made simultaneously with main net tows are not listed.

Appendix Table 1.--Summary of tows, September 1957 to November 1958

Tow	Date	North lat.	West long.	Depth (fm.)	Time (EST) start	Time (EST) finish	Average carapace length (mm.) Males	Average carapace length (mm.) Females	Numbers in sample 1/ Males	Numbers in sample 1/ Females	Gear 2/
					Cruise I, (FWS), September, 1957						
1	18	24° 49'	82° 03'	10	2040	2110	21.5	28.8	(12	50)	M
2	"	" 52'	" 18'	14	2315	2400	25.5	29.0	50	34 3/	M
3	19	" "	" 20'	14	1950	2010	--	--	(2	2)	T
4	"	" 51'	" 16'	13	2020	2050	--	--	(6	5)	T
5	"	" 49'	" 12'	12	2115	2145	23.9	30.5	(33	28)	T
6	"	" 48'	" 09'	11	2210	2330	--	--	3	13	T
7	20	" 47'	" 06'	11	2350	0200	--	--	--	-- 3/	T
					Cruise II, (FWS), September, 1957						
1	23	24° 53'	82° 10'	13	1900	1915	--	--	(0	1)	T
2	"	" 55'	" 13'	14	1940	1955	--	--	(9	9)	T
3	"	" "	" 15'	13-15	2000	2100	26.5	35.7	(49	52)	M
4	"	" 56'	" 21'	15-16	2240	2340	26.0	32.7	(32	39)	M
5	24	" "	" 32'	17	0330	0530	30.5	39.9	(57	44)	M
6	"	" 07'	" 35'	20-22	1930	2045	35.6	45.9	(58	23)	M
7	"	" 56'	" 27'	17	2200	2300	25.3	29.2	(51	49)	M
8	25	" 50'	" 07'	11	0015	0030	--	--	(1	6)	T
					Cruise 1, November, 1957						
1	5	24° 49'	82° 06'	11	1855	1925	21.8	23.1	(19	21)	LT
2	"	" 51'	" 08'	12	2005	2035	23.1	24.7	(17	10)	LT
3	"	" 53'	" 09'	13	2125	2155	24.1	26.3	(17	16)	LT
4	"	" 59'	" 17'	14	2240	2310	--	--	0	1	M
5	6	25° 09'	" 28'	19	0220	0250	--	--	0	0	M
6	"	" 12'	" 38'	20	0400	0430	--	--	1	1	M
7	"	" 06'	" 30'	19-17	0535	0555	27.1	38.4	14	25	M
8	"	" "	" 31'	18	1840	2115	28.6	34.6	77	64	M
9	"	24° 57'	" 19'	15	2140	0020	27.4	30.3	42	45	M
10	7	" 52'	" 12'	13	0100	0330	22.1	24.7	62	49	M
					Cruise 2, November, 1957						
1	23	24° 47'	82° 08'	12	1845	2015	26.4	31.8	35	60	M
2	"	" 50'	" 14'	13	2130	0010	27.7	31.8	59	49	M
3	24	" 53'	" 18'	14-17	0045	0345	27.4	32.9	82	48	M
4	"	" 52'	" 28'	16-17	0355	0635	29.3	35.4	30	15	M
5	"	" "	" 35'	17-19	1830	1935	29.3	32.4	55	15	M
6	"	" 53'	" 40'	19-20	2000	2210	33.5	44.2	29	22	M
7	"	" 50'	" 42'	20-18	2230	0115	27.7	28.4	49	43	M
8	25	" 45'	" 40'	17	0130	0325	26.4	29.9	32	22	M
9	"	" "	" 34'	16-14	0450	0640	28.3	33.4	22	13	M
10	"	" 51'	" 15'	14-13	1820	2220	26.1	37.6	19	44	M

Appendix Table 1 (cont'd)

Tow	Date	North lat.	West long.	Depth (fm.)	Time (EST) start	Time (EST) finish	Average carapace length (mm.) Males	Average carapace length (mm.) Females	Numbers in sample 1/ Males	Numbers in sample 1/ Females	Gear 2/
					Cruise 3, December, 1957						
1	17	24°47'	82°06'	11	1830	1910	22.6	26.6	98	68	M
2	"	" 52'	" 14'	14	2000	2130	25.7	30.8	52	59	M
3	"	" 55'	" 22'	15	2310	0200	27.7	33.4	36	32	M
4	18	" 58'	" 29'	17	0245	0500	28.6	32.5	39	28	M
5	"	" 59'	" 30'	17	0505	0630	28.1	33.3	25	16	M
6	"	" "	" 37'	19	1830	2100	29.7	32.7	36	19	M
7	"	" "	" 42'	21	2130	2230	33.8	39.5	17	28	M
8	19	" 56'	" 48'	23	0032	0125	28.6	32.7	16	23	M
9	"	" 54'	" 53'	24	0215	0245	28.5	30.2	(25	15)	LT
10	"	" 52'	" 47'	22	0320	0620	27.0	34.1	36	28	LT
11	"	" 47'	" 40'	18	1830	2000	25.0	27.1	38	35	M
12	"	" 47'	" 32'	16	2040	2345	23.1	29.8	31	33	M
13	20	" "	" 20'	14	0330	0630	23.5	27.9	35	42	M
					Cruise 4, December, 1957						
1	27	24°48'	82°02'	11	1945	2045	23.7	27.3	94	67	M
2	"	" 46'	" 10'	12	2115	2312	23.0	26.0	43	63	M
3	28	" 45'	" 23'	13	2355	0210	25.7	30.0	54	57	M
4	"	" 44'	" 39'	16-17	0335	0415	25.9	32.0	38	36	M
5	"	" 49'	" 47'	19	0550	0635	29.0	33.3	49	48	M
6	"	" 54'	" 53'	23	1850	1928	30.0	34.2	42	27	M
7	"	" 56'	" 45'	21	2010	2110	30.3	36.0	46	19	M
8	"	" 59'	" 37'	20	2155	2245	28.5	35.5	24	14	M
9	"	25°06'	" 37'	21	2355	0040	30.8	40.7	15	19	M
10	29	" 02'	" 32'	19-18	0145	0355	30.4	34.4	30	28	M
11	"	24°55'	" 26'	17	0500	0655	27.5	32.0	45	21	M
12	"	" 53'	" 20'	15	1820	2040	27.8	31.2	44	36	M
13	"	" 58'	" 16'	14	2050	2330	26.4	29.0	73	55	M
14	"	25°02'	" 14'	14	2335	0100	27.8	31.8	41	28	M
15	30	24°52'	" 10'	13	0105	0400	28.1	31.1	42	23	M
16	"	" 51'	" 05'	11	0510	0615	24.1	27.4	73	50	M
					Cruise 5, January 1958						
1	14	24°45'	82°00'	10	1845	1935	20.1	22.9	35	51	M
2	"	" 47'	" 15'	13	2250	2345	21.8	25.3	34	28	M
3	15	" 45'	" 27'	14	0035	0300	21.9	24.7	31	46	M
4	"	" 44'	" 35'	16	2205	2330	24.0	31.0	22	43	M
5	"	" 44'	" 32'	15-14	2350	0210	21.3	26.6	20	35	M

Appendix Table 1 (cont'd)

Tow	Date	North lat.	West long.	Depth (fm.)	Time (EST) start	Time (EST) finish	Average carapace length (mm.) Males	Average carapace length (mm.) Females	Numbers in sample 1/ Males	Numbers in sample 1/ Females	Gear 2/
				Cruise 6, January 1958							
1	28	24°44'	82°46'	16-17	2200	2240	27.0	34.6	28	39	M
2	28-29	" "	" 54'	18	2350	0120	27.0	32.9	38	20	M
3	29	" 39'	83°00'	15	0215	0230	--	--	0	0 3/	LT
4	"	" 41'	" 07'	29-30	0310	0345	--	--	1	5	LT
5	"	" 46'	82°37'	17	1915	0010	26.9	32.8	29	43	M
				Cruise 7, February 1958							
1	17	24°51'	82°01'	11	1850	2210	24.5	29.4	55	53	M
2	"	" 49'	" 04'	11	2225	0110	24.4	29.2	58	36	M
3	18	" 49'	" 12'	13	0145	0250	24.4	28.7	48	29	M
4	"	" 49'	" 21'	14	0330	0550	25.2	28.5	33	33	M
5	"	" 53'	" 23'	15-16	1840	2310	27.1	32.2	35	43	M
6	19	" 54'	" 25'	17-16	2200	0035	28.8	37.0	24	38	M
7	"	" 49'	" 33'	17	0120	0415	25.6	31.4	48	44	M
8	"	" 49'	" 44'	19	0520	0640	27.3	32.4	66	50	M
9	"	" 47'	" 53'	20	1900	2005	28.9	33.6	17	42	M
10	"	" 47'	" 35'	17	2200	2440	25.7	30.6	44	37	M
11	20	" 51'	" 23'	15	0245	0340	25.6	30.2	20	35	M
				Cruise 8, February 1958							
1	25	24°31'	82°50'	13	2345	0020	--	--	0	0 3/	LT
2	26	" 27'	" 37'	20	0150	0200	--	--	0	0 3/	T
3	"	" 41'	" 41'	14	0355	0530	31.1	39.5	19	33	M
4	"	" 39'	" 42'	14	0535	0645	31.0	38.4	36	38	M
5	"	" 45'	" 43'	17	1910	2050	28.3	33.2	43	38	M
6	"	" 47'	" 33'	16	2205	2335	24.2	30.8	46	19	M
7	27	" 51'	" 12'	13	0205	0325	24.8	28.2	41	21	M
				Cruise 9, March 1958							
1	10	24°45'	81°56'	9	1915	2040	24.4	30.1	38	51	M
2	"	" 44'	82°03'	10	2140	2310	23.3	27.0	122	38	M
3	11	" 47'	" 12'	12	0040	0205	25.1	30.2	30	26	M
4	"	" 43'	" 26'	12	0445	0645	23.4	30.0	53	32	M
5	"	" 42'	" 33'	14	1855	1940	23.3	27.9	41	49	LT
6	"	" 49'	" 46'	19	2130	2225	29.7	34.4	(18	22)	LT
7	"	" 58'	" 41'	20	2340	0105	31.7	38.0	(31	25)	LT
8	12	" 56'	" 33'	18	0205	0320	29.4	39.4	(15	16)	LT
9	"	" 54'	" 30'	17	0415	0505	--	35.1	(4	8)	LT
10	"	" 47'	" 03'	11	1905	2030	25.1	30.8	46	45	M
11	"	" 49'	" 02'	11	2115	2225	25.5	31.5	64	58	M
12	13	" 57'	" 07'	12	0110	0115	--	--	0	0	M
13	"	" 57'	81°58'	12	0140	0235	29.4	35.7	56	48	M

Appendix Table 1 (cont'd)

Tow	Date	North lat.	West long.	Depth (fm.)	Time (EST) start	Time (EST) finish	Average carapace length (mm.) Males	Average carapace length (mm.) Females	Numbers in sample 1/ Males	Numbers in sample 1/ Females	Gear 2/
					Cruise 10, March 1958						
1	25	24°50'	82°15'	14	1935	2205	24.9	28.1	28	55	M
2	26	" 52'	" 29'	16	2030	2130	24.6	29.6	46	33	M
3	"	" 54'	" 38'	19	2300	0015	28.5	35.7	46	23	M
4	27	" 53'	" 44'	20	0100	0230	29.3	36.2	31	19	M
5	"	" 47'	" 50'	19	0325	0630	29.1	35.3	27	28	M
6	"	" 39'	" 43'	14	1915	2015	30.3	38.0	10	25	M
7	"	" 44'	" 37'	16	2100	2230	23.7	27.5	34	33	M
8	28	" 48'	" 21'	14	0000	0220	22.0	25.5	40	29	M
9	"	" 52'	" 10'	13	0320	0410	23.4	25.3	47	34	M
10	"	" "	" 07'	11	0450	0535	23.6	28.1	36	42	M
					Cruise 11, April 1958						
1	7	24°44'	82°04'	10	1935	2140	21.1	24.2	39	23	M
2	"	" 46'	" 12'	12	2240	0030	23.7	29.5	20	26	M
3	8	" 47'	" 30'	15	0250	0420	23.1	27.8	50	38	M
4	"	" 42'	" 28'	12	0520	0605	23.9	28.9	14	42	M
5	"	" 50'	" 43'	19	1930	2040	29.3	38.0	34	28	M
6	"	" 54'	" 54'	18	2140	2240	30.8	37.8	33	28	M
7	"	" 58'	" 39'	20	2325	0040	31.7	38.5	44	26	M
8	9	" 54'	" 32'	17	0155	0335	29.3	35.0	51	29	M
9	"	" 50'	" 34'	17	0415	0610	27.2	35.1	42	40	M
10	"	" 45'	" 30'	15	1930	2230	22.7	25.6	61	71	M
11	10	" "	" 19'	12	0005	0040	22.1	28.1	50	51	M
12	"	" 47'	" 16'	13	0120	0330	23.1	26.8	44	28	M
13	"	" 46'	" 05'	11	0410	0535	22.8	26.8	39	25	M
					Cruise 12, April 1958						
1	22	24°45'	82°01'	10	1955	2030	20.1	23.7	43	36	M
2	"	" 52'	" 14'	14	2315	0110	24.4	28.0	53	67	M
3	23	" "	" 26'	16	0225	0336	29.0	34.1	27	52	M
4	"	" "	" 37'	18	0430	0530	31.0	37.6	67	64	M
5	"	" 40'	" 43'	15	1950	2055	31.0	39.7	27	45	M
6	"	" 46'	" 56'	23	2315	0020	30.4	37.8	25	46	M
7	24	" 48'	" 52'	21	0100	0140	31.7	38.5	46	32	M
8	"	" 49'	" 50'	20	0215	0325	30.9	39.1	88	42	M
9	"	" "	" 01'	11	1923	2205	23.1	27.8	62	88	M
10	"	" 54'	" 02'	12	2300	2400	22.6	28.6	102	84	M
11	25	" 59'	" 05'	13	0100	0200	25.3	36.6	21	34	M
12	"	" 45'	81°58'	9	0440	0503	20.1	23.4	57	39	M

Appendix Table 1 (cont'd)

Tow	Date	North lat.	West long.	Depth (fm.)	Time (EST) start	Time (EST) finish	Average carapace length (mm.) Males	Average carapace length (mm.) Females	Numbers in sample 1/ Males	Numbers in sample 1/ Females	Gear 2/
					Cruise 13, May, 1958						
1	6	24°44'	82°04'	10	1947	2150	21.6	24.5	34	38	M
2	"	" 46'	" 12'	12	2315	0045	22.8	27.2	40	34	M
3	7	" 45'	" 26'	13	0240	0500	22.2	26.2	33	51	M
4	8	" 46'	" 58'	24	2000	2108	32.0	38.6	61	53	M
5	"	" 47'	" 50'	19	2300	2325	31.4	40.6	(85	51)	M
6	9	" "	" 38'	17	0035	0126	31.2	39.3	128	87	M
7	"	" 48'	" 28'	15	0230	0320	26.8	34.1	35	60	M
8	"	" 53'	" 19'	14	0405	0530	24.6	31.0	40	68	M
9	"	" 42'	" 11'	10	1950	2115	20.5	25.8	72	93	M
10	"	" 47'	" 05'	11	2230	0025	23.2	28.3	53	105	M
11	10	" 48'	" 01'	11	0140	0510	23.0	26.9	55	92	M
					Cruise 14, May, 1958						
1	22	25°01'	82°07'	12	2120	2400	23.4	28.5	49	59	M
2	23	24°58'	" 10'	13	0050	0325	26.2	33.3	15	45	M
3	"	" 43'	" 37'	16	2355	0030	23.7	26.6	(9	15)	T
4	24	" 50'	" 37'	18	0052	0215	29.9	35.4	(19	12)	T
5	"	" 54'	" 45'	22	0320	0355	--	--	0	0 4/	T
6	"	" 53'	" 47'	22	0410	0435	--	--	0	0 4/	T
7	"	" 49'	" 48'	20	0500	0530	--	--	0	0 4/	T
8	"	" "	" 22'	15	2225	2325	23.1	27.1	73	58	M
9	"	" 50'	" 18'	14	2355	0055	26.1	32.6	48	48	M
10	25	" 51'	" 11'	13	0130	0230	26.6	33.0	30	33	M
11	"	" 47'	81°59'	9	0450	0520	21.1	24.0	(10	6)	T
					Cruise 15, June, 1958						
1	9	24°44'	82°06'	10	2013	2240	21.9	26.2	68	98 3/	M
2	10	" 47'	" 18'	13	0034	0055	22.6	25.9	48	54	M
3	"	" 46'	" 29'	15	0300	0400	23.5	28.7	37	45	M
4	"	" 39'	" 43'	15	2030	2040	--	--	0	0 4/	T
5	"	" 49'	" 48'	20	2210	2230	--	--	0	0 4/	T
6	11	" 55'	" 36'	18	2400	0015	--	--	0	0 4/	T
7	"	" 50'	" 28'	16	0115	0140	--	--	0	0 4/	T
					Cruise 16, July, 1958						
1	16	24°04'	82°10'	12	2138	2347	24.4	29.0	129	161	M
2	17	" 58'	" 27'	17	0146	0312	28.7	35.6	105	95	M
3	"	" 53'	" 28'	16	0357	0445	--	--	3	6	M
4	"	" 50'	" 40'	18	2205	2325	28.8	38.7	93	58	M
5	18	" 50'	" 33'	17	0010	0215	29.1	39.6	115	55	M
6	"	" "	" 26'	16	0325	0405	26.9	35.6	58	39	M
7	"	" 45'	" 23'	13	0443	0513	24.5	30.1	71	116	M
8	"	" 43'	" 10'	10	2021	2100	23.4	31.1	(15	68)	M

Appendix Table 1 (cont'd)

Tow	Date	North lat.	West long.	Depth (fm.)	Time (EST) start	Time (EST) finish	Average carapace length (mm.) Males	Average carapace length (mm.) Females	Numbers in sample 1/ Males	Numbers in sample 1/ Females	Gear 2/
					Cruise 16, continued						
9	18	24°48'	82°10'	12	2130	2225	24.4	28.3	113	100	M
10	"	" 47'	" 03'	11	2330	0230	23.9	29.1	161	178	M
11	19	" 44'	" 04'	10	0305	0430	23.2	28.5	74	98	M
					Cruise 17, July, 1958						
1	24	24°47'	81°55'	9	1955	2035	22.6	26.9	43	72	M
2	"	" 48'	" "	9	2050	2335	22.5	27.0	63	88	M
3	25	" 48'	82°20'	14	0255	0345	25.6	31.6	25	63	M
4	"	" 47'	" 28'	15	0448	0530	26.1	32.4	42	62	M
5	26	" 46'	" 11'	12	2000	2029	23.1	29.2	37	72	M
6	"	" 51'	" "	13	2104	2150	26.7	34.0	47	48	M
7	27	" "	" 02'	11	2255	0005	24.7	29.8	41	78	M
8	"	" 48'	81°55'	9	0105	0415	22.4	26.9	322	351	M
					Cruise 18, August, 1958						
1	5	24°58'	82°08'	13	2054	2118	25.3	31.3	(21	21)	M
2	"	" "	" 13'	14	2145	2220	28.1	35.4	39	53	M
3	"	" "	" 16'	15	2233	2327	28.3	34.3	43	64	M
4	6	" 55'	" 22'	15	0017	0202	29.9	38.6	78	47	M
5	"	" 51'	" "	15	0220	0320	30.0	41.3	(28	39)	M
6	"	" 48'	" 26'	15	0345	0550	28.0	37.1	64	44	M
7	7	" 47'	" 19'	14	2111	2200	--	--	(1	3)	T
8	"	" "	" 15'	13	2220	2255	--	30.6	(5	16)	T
9	"	" "	" 11'	12	2310	2358	--	--	(2	10)	T
					Cruise 19, August, 1958						
1	22	24°49'	82°08'	12	2245	0005	25.5	29.6	61	76	M
2	23	" 48'	" 14'	13	0025	0156	25.7	31.7	44	47	M
3	"	" 47'	" 18'	14	0211	0311	24.8	31.3	28	54	M
4	"	" 43'	" 33'	14-15	0447	0548	26.2	32.2	49	93	M
5	"	" 48'	" 59'	25	1942	2030	27.8	37.0	29	72	M
6	"	" 50'	83°02'	27	2055	2300	27.7	36.1	44	44	M
7	24	" 48'	82°55'	23	0225	0315	--	--	(7	6) 4/	T
8	"	" "	" 52'	21	0330	0405	--	--	(4	3) 4/	T
9	"	" "	" 47'	20	0435	0505	--	--	(2	5) 4/	T
10	"	" "	" 42'	18	0530	0600	--	--	0	0 4/	T
11	"	" 46'	" 35'	17	1935	2052	28.2	34.8	33	65	M
12	"	" "	" 27'	15	2155	2255	27.8	33.5	39	55	M
13	25	" 47'	" 10'	12	0115	0220	23.9	28.9	69	135	M
14	"	" 50'	" 05'	11	0246	0515	22.2	25.4	76	80	M

Appendix Table 1 (cont'd)

Tow	Date	North lat.	West long.	Depth (fm.)	Time (EST) start	Time (EST) finish	Average carapace length (mm.) Males	Average carapace length (mm.) Females	Numbers in sample 1/ Males	Numbers in sample 1/ Females	Gear 2/
					Cruise 20, September, 1958						
1	8	24°46'	81°56'	9	1926	2005	15.4	17.6	111	145	M
2	"	" 44'	82°05'	10	2110	2205	18.4	18.7	43	59	M
3	9	" 49'	" 25'	16	0032	0127	28.1	35.8	53	39	M
4	"	" "	" 37'	18	0235	0535	27.4	35.5	44	29	M
5	"	" 48'	" 45'	19	1935	2023	29.9	38.9	35	35	M
6	"	" 49'	" 47'	20	2043	2315	31.6	40.4	30	47	M
7	"	" 51'	" 48'	21	2338	0040	31.0	40.9	35	48	M
8	10	" 52'	" 48'	22	0056	0118	31.4	41.2	(28	35) 4/	M
9	"	" 53'	" 49'	23	0150	0228	--	--	(9	6) 4/	T
10	"	" 51'	" 55'	24	0300	0400	30.9	38.4	(21	22) 4/	M
11	"	" 45'	" 35'	17	2028	2143	23.9	26.8	39	50	M
12	"	" 46'	" 20'	14	2250	0010	20.6	19.6	29	51	M
13	11	" 48'	" 20'	14	0035	0138	23.8	28.4	35	34	M
14	"	" 51'	" 16'	14	0215	0330	29.6	38.3	22	21	M
15	"	" 54'	" 13'	14	0355	0500	27.8	27.4	17	20	M
16	"	" 50'	" 10'	13	1915	2115	20.0	20.6	34	65	M
17	"	" "	" 13'	13	2124	2315	22.7	25.6	45	33	M
18	"	" "	" 10'	13	2321	0116	24.4	23.2	32	57	M
19	12	" "	" 13'	13	0128	0400	24.9	30.0	29	44	M
					Cruise 21, September, 1958						
1	23	24°53'	82°05'	12	1921	2040	20.3	25.0	25	55	M
2	"	" 57'	" 07'	13	2110	2145	--	--	(3	6) 4/	M
3	24	" 56'	" 22'	13	0013	0103	21.8	23.1	60	56	M
4	"	" 46'	" 41'	17	0231	0533	21.2	26.7	35	61	M
5	"	" 52'	" 42'	19	1928	2033	29.0	33.5	41	43	M
6	"	" 57'	" 41'	20	2055	2202	26.2	31.0	41	40	M
7	"	" 59'	" 45'	23	2232	2332	30.8	42.3	25	36	M
8	25	" 53'	" 49'	23	0003	0230	31.5	40.6	33	46	M
9	"	" 41'	" 41'	14	0434	0546	28.3	37.2	16	66	M
10	"	" 23'	" 35'	23	2035	2055	--	--	(1	4)	T
11	"	" "	" 36'	23	2122	2142	--	--	0	0	T
12	"	" "	" "	23	2203	2302	--	--	(0	8) 4/	T
13	26	" 24'	" 39'	22	0005	0012	--	--	0	0 3/	T
14	"	" 39'	" 40'	14	0227	0430	24.1	34.4	13	73	M
15	"	" 42'	" 34'	15	0520	0600	20.5	28.0	(26	60)	M
16	"	" 49'	" 27'	16	1850	2200	25.0	27.9	78	63	M
17	"	" 57'	" 26'	17	2310	2400	28.8	36.3	(31	59)	M
18	27	" 59'	" 20'	15	0050	0110	23.2	25.4	(46	55) 4/	M
19	"	" 49'	" 10'	13	0248	0334	--	--	-	- 5/	M
20	"	" 44'	" 04'	11	0420	0430	--	--	-	- 5/	M

Appendix Table 1 (cont'd)

Tow	Date	North lat.	West long.	Depth (fm.)	Time (EST) start	Time (EST) finish	Average carapace length (mm.) Males	Average carapace length (mm.) Females	Numbers in sample 1/ Males	Numbers in sample 1/ Females	Gear 2/
					Cruise 22, October, 1958						
1	17	24°44'	82°04'	10	2205	2305	21.6	24.7	44	58	M
2	18	" 48'	" 03'	11	2400	0100	18.9	21.4	(80	75)	M
3	"	" "	" 10'	12	0135	0240	21.4	26.0	25	60	M
4	"	" 47'	" 30'	15	0450	0550	22.5	27.1	39	64	M
5	"	" 41'	" 42'	14	1825	1930	20.5	29.3	26	55	M
6	"	" 45'	" 43'	17	2038	2138	25.7	28.1	26	43	M
7	"	" 46'	" 47'	18	2225	2330	21.5	22.5	33	53	M
8	19	" 51'	" 45'	20	0005	0105	28.2	34.0	55	23	M
9	"	" 48'	" 43'	19	0130	0510	28.4	30.0	38	52	M
					Cruise 23, November, 1958						
1	4	24°50'	82°04'	11	1955	2218	24.2	27.4	(45	75)	M
2	"	25°02'	" 19'	14	2340	0239	24.9	26.6	74	59	M
3	5	" 01'	" 33'	18	0356	0614	30.0	38.1	29	30	M
4	"	24°43'	" 14'	10	2050	2157	24.0	28.2	26	33	M
5	"	" 44'	" 23'	13	2253	0005	21.6	29.5	(21	38)	M
6	6	" 46'	" 31'	15	0029	0259	24.4	31.7	26	31	M
7	"	" "	" 39'	17	0314	0615	24.0	25.4	69	42	M
8	"	" 54'	" 55'	25	1822	1919	33.5	42.3	29	22	M
9	"	" 57'	" 45'	22	2018	2118	32.1	36.8	30	26	M
10	"	" 58'	" 40'	19-21	2133	2356	31.9	38.6	32	35	M
11	7	" 55'	" 31'	17-18	0010	0254	29.4	32.3	61	37	M
12	"	" 53'	" 25'	16	0309	0605	25.4	30.7	34	34	M

1/ Parentheses around number in samples indicate entire catch measured. No parentheses indicate sample of catch.

2/ M= Main net, T= Try net (15 foot spread), LT= Large try net (27 foot spread).

3/ Net torn or lost.

4/ Green algae clogged net.

5/ The "Danny Boy" capsized and samples lost.

Appendix Table 2.--Carapace length frequencies of Tortugas pink shrimp

Carapace length (mm)	Cruise I, 9/18-19/57 Tow number						Cruise II, 9/23-25/57 Tow number											
	1		2		5		2		3		4		5		6		7	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
16	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
19	1	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-
20	4	4	-	-	2	-	-	-	1	1	1	-	-	-	-	-	-	-
21	2	1	2	-	1	1	1	-	2	1	2	-	-	-	-	-	3	2
22	-	4	2	-	6	1	1	-	6	-	-	-	1	-	-	-	2	1
23	-	2	8	-	7	2	-	1	3	1	6	1	-	-	-	-	8	2
24	1	1	6	1	4	3	-	-	7	2	2	-	2	-	-	-	5	-
25	1	1	9	4	3	-	2	-	2	-	4	4	1	2	-	-	5	4
26	2	2	6	3	5	2	1	1	3	1	3	3	2	-	-	-	8	6
27	-	-	8	3	2	3	1	-	3	-	1	1	5	2	-	-	7	3
28	-	-	4	4	1	1	1	-	5	-	3	4	4	-	-	-	6	3
29	-	5	2	5	1	5	1	2	3	2	3	1	3	-	-	-	1	6
30	-	8	2	3	1	-	-	-	10	2	3	1	10	1	1	-	3	-
31	-	8	-	7	-	-	-	-	-	1	1	2	10	3	2	-	-	7
32	-	5	1	-	-	1	-	1	1	1	3	3	5	2	2	1	1	5
33	-	3	-	1	-	1	-	-	2	4	-	6	6	-	1	-	-	1
34	-	2	-	1	-	-	-	1	-	2	-	1	4	2	14	-	-	2
35	-	1	-	1	-	-	-	1	-	6	-	-	3	-	8	-	-	5
36	-	2	-	-	-	1	-	1	-	2	-	-	1	1	12	-	-	-
37	-	-	-	1	-	-	-	-	-	6	-	2	-	-	7	-	-	1
38	-	-	-	-	-	1	-	1	-	1	-	1	-	1	5	-	-	1
39	-	-	-	-	-	1	-	-	-	5	-	1	-	-	3	-	-	-
40	-	-	-	-	-	2	-	-	-	4	-	1	-	4	3	2	-	-
41	-	-	-	-	-	1	-	-	-	3	-	3	-	1	-	3	-	-
42	-	-	-	-	-	1	-	-	-	2	-	-	-	1	-	-	-	-
43	-	-	-	-	-	-	-	-	-	-	-	2	-	9	-	-	-	-
44	-	-	-	-	-	-	-	-	-	1	-	1	-	2	-	-	-	-
45	-	-	-	-	-	-	-	-	-	1	-	-	-	5	-	1	-	-
46	-	-	-	-	-	1	-	-	-	-	-	-	-	3	-	3	-	-
47	-	-	-	-	-	-	-	-	-	1	-	1	-	2	-	5	-	-
48	-	-	-	-	-	-	-	-	-	1	-	-	-	3	-	2	-	-
49	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Total	12	50	50	34	33	28	9	9	49	52	32	39	57	44	58	23	51	49

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 1, 11/5-6/57 Tow number															
	1		2		3		6		7		8		9		10	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
17	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
18	-	1	-	-	-	-	-	-	-	-	-	-	-	-	3	-
19	-	1	-	-	1	-	-	-	-	-	1	-	1	-	3	3
20	4	2	-	1	2	1	-	-	-	-	2	-	2	2	10	4
21	6	5	1	-	-	-	-	-	-	-	1	1	3	-	7	3
22	2	3	5	-	1	3	-	-	-	-	-	2	2	2	13	3
23	3	4	5	1	3	1	-	-	2	-	4	2	1	1	11	9
24	1	-	5	2	3	2	-	-	3	-	6	2	4	3	5	2
25	1	2	-	2	-	3	1	-	-	1	8	1	4	3	3	7
26	-	1	1	2	3	1	-	-	1	1	7	4	2	5	1	4
27	-	-	-	1	1	-	-	-	2	1	5	3	3	4	-	-
28	-	-	-	1	1	-	-	-	3	-	4	-	-	2	-	3
29	-	-	-	-	1	-	-	-	-	-	3	1	5	1	1	1
30	-	-	-	-	-	2	-	1	2	-	5	1	5	3	2	1
31	1	-	-	-	1	1	-	-	-	-	8	1	4	2	1	3
32	-	-	-	-	-	-	-	-	-	2	7	1	1	4	1	2
33	-	-	-	-	-	-	-	-	1	1	6	1	1	2	-	1
34	-	1	-	-	-	1	-	-	-	-	3	8	1	2	-	-
35	-	-	-	-	-	-	-	-	-	3	4	5	1	-	-	1
36	-	-	-	-	-	1	-	-	-	-	3	2	1	3	-	-
37	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
38	-	1	-	-	-	-	-	-	-	4	-	8	1	1	-	-
39	-	-	-	-	-	-	-	-	-	-	-	3	-	1	-	-
40	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
41	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-
42	-	-	-	-	-	-	-	-	-	4	-	6	-	-	-	-
43	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-
44	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
45	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
46	-	-	-	-	-	-	-	-	-	3	-	1	-	1	-	-
47	-	-	-	-	-	-	-	-	-	3	-	1	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Total	19	21	17	10	17	16	1	1	14	25	77	64	42	45	62	49

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 2, 11/23-26/57 Tow number															
	1		2		3		4		5		6		7		8	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
20	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
21	-	-	-	1	1	-	-	-	1	-	-	-	1	1	3	-
22	2	4	2	-	3	2	2	-	1	-	-	-	6	-	-	3
23	2	1	1	1	2	1	-	-	1	-	-	-	2	-	3	-
24	1	3	4	2	13	-	1	-	1	1	-	-	-	1	4	2
25	5	1	12	1	8	3	1	-	2	-	1	-	3	4	5	2
26	5	4	9	1	15	1	1	1	6	1	1	1	7	6	1	-
27	4	5	5	1	9	4	2	-	7	-	1	-	7	7	3	1
28	2	1	5	8	7	2	7	1	6	1	-	-	4	3	1	-
29	5	1	2	5	4	3	-	1	8	1	2	1	7	8	2	-
30	-	4	5	2	2	3	4	-	3	2	2	1	2	3	1	3
31	3	4	4	5	5	1	2	1	3	2	2	-	2	2	3	1
32	3	6	4	3	3	3	6	-	2	-	2	-	-	4	2	-
33	1	-	4	3	7	4	2	1	4	2	4	-	3	1	1	-
34	-	-	2	1	1	2	1	-	3	2	2	-	2	1	-	-
35	-	1	-	1	1	5	1	2	4	-	-	-	1	1	-	2
36	-	4	-	3	1	2	-	-	-	-	4	-	-	-	1	1
37	-	4	-	1	-	1	-	3	3	2	5	-	1	-	-	1
38	-	4	-	3	-	3	-	2	-	-	2	1	-	-	-	-
39	-	2	-	2	-	-	-	-	-	-	1	1	-	1	-	2
40	-	5	-	3	-	2	-	1	-	-	-	-	1	-	-	-
41	-	1	-	1	-	-	-	-	-	-	-	1	-	-	-	2
42	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-
44	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	1	-	1	-	1	-	-	-	-
46	-	-	-	-	-	4	-	1	-	-	-	-	-	-	-	-
47	-	-	-	1	-	-	-	-	-	-	-	7	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
49	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-
Total	35	60	59	49	82	48	30	15	55	15	29	22	49	43	32	22

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 2 (Cont'd) Tow number 9		10		Cruise 3, 12/17-20/57 Tow number 1		2		3		4		5	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	1	-	-	-	-	-	-	-	-	-
19	1	-	-	-	6	3	-	-	1	-	-	-	-	-
20	-	-	-	1	10	2	1	-	-	-	-	-	-	-
21	-	-	2	-	27	6	2	-	2	-	-	-	-	-
22	2	1	2	1	13	7	3	-	-	-	2	-	1	-
23	2	-	2	-	13	5	3	1	1	-	2	1	1	1
24	2	-	2	-	7	6	9	3	3	-	-	1	2	-
25	3	1	4	-	6	9	7	3	2	-	-	1	-	1
26	-	1	-	2	8	3	10	4	4	-	2	-	2	-
27	1	-	1	1	3	5	5	8	6	1	7	2	4	-
28	-	-	1	-	1	3	6	13	4	-	8	-	2	-
29	-	-	-	-	2	3	2	4	3	1	7	-	6	1
30	1	1	-	3	-	3	3	4	2	5	4	2	4	-
31	3	-	3	1	1	1	-	2	1	5	3	3	1	1
32	2	1	1	-	-	1	-	-	3	1	-	2	-	2
33	-	2	-	-	-	2	-	1	2	2	-	2	2	2
34	2	-	1	3	-	2	1	2	1	7	2	6	-	3
35	1	-	-	1	-	1	-	1	1	2	-	2	-	-
36	1	1	-	1	-	2	-	-	-	3	1	3	-	1
37	1	2	-	1	-	1	-	1	-	3	-	1	-	1
38	-	1	-	-	-	-	-	2	-	-	-	1	-	-
39	-	1	-	5	-	2	-	2	-	-	-	1	-	-
40	-	-	-	4	-	-	-	3	-	1	-	-	-	3
41	-	-	-	8	-	-	-	2	-	-	1	-	-	-
42	-	-	-	6	-	-	-	1	-	1	-	-	-	-
43	-	-	-	1	-	-	-	1	-	-	-	-	-	-
44	-	-	-	3	-	-	-	-	-	-	-	-	-	-
45	-	-	-	1	-	1	-	1	-	-	-	-	-	-
46	-	1	-	1	-	-	-	-	-	-	-	-	-	-
47	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	22	13	19	44	98	68	52	59	36	32	39	28	25	16

Appendix Table 2.--(Cont'd)

Carapacee length (mm)	Cruise 3 (Cont'd) Tow number 6		7		8		9		10		11		12		13	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
20	-	-	-	1	-	-	-	-	1	-	3	2	2	-	1	-
21	-	-	-	-	-	-	-	-	-	1	3	3	7	2	6	4
22	1	-	-	-	1	-	-	-	-	-	3	4	6	1	8	2
23	-	-	-	-	-	-	-	1	-	1	6	4	5	-	3	1
24	1	-	-	-	-	-	2	-	5	3	5	1	1	2	5	2
25	-	1	-	-	1	-	4	-	4	-	4	2	2	-	1	6
26	1	-	-	-	-	1	2	1	6	1	1	2	3	5	1	7
27	3	1	-	-	2	2	2	-	6	-	5	4	1	3	2	3
28	6	3	1	-	2	2	6	2	2	1	3	-	-	4	1	2
29	7	1	1	1	4	3	3	1	3	-	3	2	3	2	2	3
30	5	1	3	-	3	1	4	1	3	1	-	-	-	2	-	1
31	5	2	1	1	2	1	-	2	2	2	1	2	-	-	1	1
32	2	1	1	-	1	3	-	2	2	4	1	2	-	2	-	2
33	1	1	2	2	-	2	-	-	1	1	-	1	-	-	-	1
34	1	2	2	3	-	2	-	-	-	1	-	2	-	-	-	1
35	1	1	-	3	-	2	-	-	-	1	-	1	-	1	1	1
36	1	1	1	1	-	1	-	2	1	1	-	1	-	1	-	2
37	1	2	3	2	-	1	-	2	-	2	-	1	-	1	-	-
38	-	-	-	1	-	-	-	-	-	1	-	-	-	2	-	1
39	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-
40	-	-	2	2	-	-	1	-	-	-	-	-	-	2	-	-
41	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	2
42	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
43	-	1	-	1	-	-	-	-	-	-	-	1	-	2	-	-
44	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-	-
47	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
49	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-
50	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-
51	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
55	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Total	36	19	17	28	16	23	25	15	36	28	38	35	31	33	35	42

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 4, 12/27-30/57 Tow number 1		2		3		4		5		6		7		8		9	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
16	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	1	-	-	1	-	-	-	-	1	-	-	1	-	-	-	-	-	-
20	4	-	1	1	1	-	2	-	-	-	-	-	-	-	-	-	-	-
21	10	3	6	3	-	-	-	-	1	-	-	-	-	-	-	-	-	-
22	15	3	15	4	4	-	1	-	-	-	-	-	-	-	2	-	1	-
23	15	5	9	4	6	4	5	1	-	-	-	-	1	-	-	-	-	-
24	20	3	7	9	8	3	5	2	-	-	2	-	-	-	-	1	-	-
25	9	5	2	11	8	4	4	2	2	1	1	1	3	-	2	-	1	-
26	7	12	1	13	9	5	3	4	5	-	2	1	1	1	1	-	-	-
27	4	7	-	6	8	4	5	2	10	1	4	-	2	-	-	-	1	-
28	3	7	1	2	2	9	7	2	8	2	5	1	2	-	5	2	-	-
29	3	5	-	-	3	7	2	-	5	4	3	-	5	-	3	-	-	-
30	-	7	-	3	3	2	1	2	6	9	8	-	9	2	6	1	2	-
31	-	2	-	1	-	3	3	-	1	3	6	2	6	3	3	-	5	-
32	2	1	1	-	1	2	-	3	2	4	5	1	11	-	2	-	-	1
33	-	2	-	1	1	4	-	4	3	3	2	4	3	1	-	-	3	-
34	-	-	-	-	-	-	-	2	1	6	2	1	-	-	-	2	2	1
35	-	3	-	1	-	2	-	3	1	5	-	4	-	5	-	1	-	1
36	-	2	-	-	-	1	-	-	-	2	2	5	1	2	-	-	-	2
37	-	-	-	-	-	-	-	1	1	2	-	1	-	-	-	1	-	-
38	-	-	-	1	-	-	-	2	2	1	-	1	1	1	-	1	-	1
39	-	-	-	1	-	4	-	3	-	2	-	3	-	1	-	2	-	-
40	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	1	-	3
41	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	1	-	-
42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
44	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
45	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-
46	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2
47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
49	-	-	-	-	-	-	-	-	-	2	-	1	-	1	-	-	-	1
50	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Total	94	67	43	63	54	57	38	36	49	48	42	27	46	19	24	14	15	19

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 4 (Cont'd) Tow number 10		11		12		13		14		15		16		Cruise 5, 1/14-16/58 Tow number 1		2	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	1
18	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2	1	5	1
19	-	-	-	-	-	-	-	-	-	-	-	-	1	1	7	7	2	1
20	-	-	-	-	-	-	1	-	1	-	-	-	-	-	8	3	4	1
21	-	-	1	1	-	-	-	-	-	-	1	-	5	1	4	6	7	1
22	-	1	-	-	-	1	3	3	-	-	-	-	10	1	5	5	4	5
23	1	1	2	-	1	-	6	1	1	-	3	1	14	2	5	6	5	3
24	2	1	6	2	4	1	8	4	-	1	4	-	16	7	1	5	3	2
25	-	1	2	1	4	2	8	2	3	1	7	1	8	3	-	3	1	3
26	-	2	3	1	3	1	9	4	4	1	-	2	11	7	-	5	1	3
27	3	-	4	-	8	4	15	8	6	2	2	3	3	3	-	4	1	1
28	2	-	8	-	8	1	9	5	7	3	3	3	2	5	-	1	1	1
29	3	-	6	1	7	4	7	5	10	1	9	1	1	5	-	2	-	1
30	4	-	5	3	4	3	7	2	6	2	4	2	2	5	-	-	-	-
31	2	1	7	-	3	4	-	4	3	5	4	1	-	1	-	-	-	1
32	6	4	-	5	1	1	-	9	-	2	1	1	-	3	-	1	-	-
33	2	1	-	-	-	3	-	2	-	1	-	2	-	1	-	-	-	-
34	2	3	-	-	1	3	-	4	-	1	2	-	-	2	-	-	-	-
35	1	1	-	2	-	3	-	-	-	3	-	-	-	-	-	-	-	-
36	1	2	-	-	-	1	-	1	-	1	-	2	-	2	-	-	-	-
37	1	1	-	1	-	1	-	-	-	2	1	1	-	1	-	-	-	1
38	-	1	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-
39	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
40	-	2	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-
41	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
42	-	1	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-
43	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
45	-	-	-	1	-	1	-	1	-	-	-	-	-	-	-	-	-	1
46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	30	28	45	21	44	36	73	55	41	28	42	23	73	50	35	51	34	28

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 5 (Cont'd) Tow number 3		4		5		Cruise 6, 1/28-30/58 Tow number 1		2		5		Cruise 7, 2/17-20/58 Tow number 1		2		3	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
18	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
19	2	1	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
20	3	2	2	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-
21	10	2	5	1	5	4	-	-	1	-	-	-	2	-	-	1	1	-
22	8	7	3	1	4	2	2	-	-	-	1	-	4	1	4	1	5	-
23	4	6	2	1	4	5	2	-	3	-	2	-	9	-	11	-	12	-
24	2	6	2	-	1	3	-	-	4	-	3	1	17	4	13	1	9	1
25	2	7	2	2	-	2	5	-	3	-	8	-	10	1	14	1	15	4
26	-	6	1	5	-	4	2	-	4	1	2	2	7	5	12	4	2	3
27	-	2	3	3	-	3	4	-	8	3	4	4	3	6	2	4	3	1
28	-	2	-	4	-	3	5	2	4	2	2	1	2	7	-	2	-	4
29	-	-	-	2	-	1	3	4	4	2	1	5	1	5	2	5	-	4
30	-	4	1	3	-	1	3	4	4	2	2	2	-	8	-	5	-	8
31	-	-	-	-	-	2	1	2	2	-	1	2	-	5	-	2	-	-
32	-	-	1	2	-	-	-	1	1	1	1	5	-	5	-	3	-	2
33	-	-	-	1	-	-	1	3	-	1	1	6	-	2	-	3	-	1
34	-	-	-	-	-	-	-	5	-	2	-	4	-	1	-	1	-	-
35	-	-	-	5	-	-	-	4	-	-	-	4	-	-	-	3	-	-
36	-	1	-	-	-	2	-	3	-	1	1	-	-	1	-	-	-	-
37	-	-	-	2	-	1	-	1	-	-	-	-	-	-	-	-	-	1
38	-	-	-	3	-	-	-	1	-	2	-	1	-	-	-	-	-	-
39	-	-	-	2	-	-	-	5	-	-	-	1	-	-	-	-	1	-
40	-	-	-	1	-	-	-	-	-	1	-	2	-	-	-	-	-	-
41	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
42	-	-	-	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-
43	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
44	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
45	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
47	-	-	-	-	-	1	-	-	-	1	-	1	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
49	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Total	31	46	22	43	20	35	28	39	38	20	29	43	55	53	58	36	48	29

Appendix Table 2.--(Cont'd)

Cruise 7, (Cont'd)

Carapace length (mm)	Tow number 4		5		6		7		8		9		10		11	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
21	1	2	-	1	-	-	-	-	1	-	-	-	-	-	-	-
22	3	1	1	-	-	-	1	-	1	-	-	-	3	1	-	-
23	6	1	-	-	-	-	4	-	2	1	-	-	5	-	2	-
24	5	-	5	-	1	-	9	2	6	2	-	-	6	3	3	-
25	6	2	4	2	2	-	11	1	9	-	2	2	9	2	4	1
26	3	3	5	1	-	-	10	2	5	-	1	-	6	-	7	3
27	5	4	10	-	7	1	6	4	9	2	3	-	11	4	1	2
28	2	3	5	6	3	1	3	3	12	6	3	1	1	3	-	3
29	-	3	1	1	3	1	2	2	10	2	3	4	1	5	1	9
30	1	3	3	4	4	2	1	4	5	4	1	5	1	2	1	3
31	-	5	-	2	3	2	1	5	4	3	1	4	-	3	1	5
32	-	2	-	5	-	3	-	6	1	7	1	2	-	5	-	2
33	1	2	-	3	-	5	-	6	1	4	1	2	-	4	-	3
34	-	1	-	3	-	3	-	2	-	2	-	3	1	1	-	1
35	-	1	1	5	1	3	-	2	-	5	-	3	-	-	-	1
36	-	-	-	3	-	-	-	1	-	3	-	5	-	1	-	-
37	-	-	-	3	-	3	-	2	-	3	1	3	-	-	-	-
38	-	-	-	1	-	2	-	-	-	2	-	4	-	-	-	-
39	-	-	-	-	-	1	-	-	-	1	-	2	-	-	-	-
40	-	-	-	2	-	1	-	-	-	1	-	1	-	-	-	1
41	-	-	-	1	-	1	-	-	-	-	-	-	-	1	-	-
42	-	-	-	-	-	2	-	-	-	-	-	-	-	1	-	-
43	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
44	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	-	-	-	-	2	-	1	-	-	-	1	-	-	-	1
47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	-	-	-	-	-	4	-	1	-	-	-	-	-	1	-	-
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Total	33	33	35	43	24	38	48	44	66	50	17	42	44	37	20	35

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 8, 2/25-27/58 Tow number 3		4		5		6		7		Cruise 9, 3/10-13/58 Tow number 1		2		3		4	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
20	-	-	-	-	-	-	2	-	1	-	-	-	1	-	-	-	-	-
21	-	-	-	-	-	-	2	-	1	-	2	-	7	-	-	-	4	-
22	-	-	1	-	1	-	4	-	2	-	5	-	21	1	2	-	9	1
23	1	-	-	-	-	1	7	-	6	-	5	-	41	1	4	1	17	2
24	-	-	-	-	4	-	13	1	10	1	10	-	33	2	8	-	10	-
25	-	1	2	-	5	-	7	2	10	2	7	2	13	8	6	1	7	3
26	-	-	1	-	9	1	6	1	5	2	5	1	6	5	3	-	4	7
27	1	-	1	1	1	1	1	4	3	4	3	4	-	4	6	3	-	1
28	-	-	4	-	5	4	3	-	-	1	-	5	-	2	1	1	1	4
29	2	-	2	-	3	3	1	3	1	5	1	8	-	9	-	5	1	4
30	4	-	4	2	1	1	-	1	2	1	-	11	-	3	-	5	-	1
31	3	-	3	-	3	3	-	-	-	1	-	9	-	1	-	2	-	1
32	2	2	2	1	3	2	-	1	-	2	-	5	-	2	-	4	-	-
33	2	2	5	2	2	3	-	1	-	-	-	3	-	-	-	-	-	1
34	2	-	7	2	3	4	-	2	-	1	-	1	-	-	-	2	-	-
35	1	2	4	4	2	1	-	-	-	1	-	1	-	-	-	-	-	-
36	1	-	-	6	-	4	-	-	-	-	-	-	-	-	-	1	-	1
37	-	5	-	2	-	5	-	-	-	-	-	1	-	-	-	-	-	-
38	-	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
39	-	2	-	2	-	3	-	-	-	-	-	-	-	-	-	-	-	1
40	-	5	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	1
41	-	2	-	5	-	-	-	1	-	-	-	-	-	-	-	-	-	-
42	-	5	-	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-
43	-	1	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	2
44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	3	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	2
47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	19	33	36	38	43	38	46	19	41	21	38	51	122	38	30	26	53	32

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 9, (Cont'd) Tow number 5		6		7		8		9		10		11		13	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
19	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	5	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-
23	15	3	-	-	-	-	1	-	-	-	6	-	5	-	-	-
24	3	3	-	-	-	-	-	-	-	-	18	-	16	1	1	-
25	7	7	1	-	-	-	-	-	-	-	6	-	17	1	1	-
26	2	3	-	2	-	-	1	-	-	-	7	2	11	-	5	-
27	2	6	5	-	1	1	-	-	-	-	5	4	12	2	3	-
28	1	7	2	-	4	-	1	-	-	-	-	3	3	2	8	-
29	-	5	1	1	3	-	5	-	1	1	2	5	-	7	9	1
30	-	3	1	1	5	-	3	-	-	-	-	8	-	7	10	2
31	1	3	4	1	5	-	1	-	1	-	1	10	-	6	6	3
32	-	1	2	2	3	-	-	-	-	1	-	5	-	11	5	6
33	-	3	2	-	3	1	2	1	-	1	-	4	-	11	3	6
34	-	2	-	1	3	3	-	-	1	1	-	1	-	4	3	2
35	-	-	-	8	-	1	1	2	-	1	-	1	-	3	-	5
36	-	-	-	-	2	3	-	2	1	-	-	1	-	3	1	4
37	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-	4
38	-	-	-	1	1	4	-	1	-	1	-	-	-	-	-	3
39	-	-	-	2	1	2	-	1	-	1	-	-	-	-	-	4
40	-	-	-	-	-	3	-	2	-	-	-	-	-	-	-	4
41	-	1	-	1	-	2	-	2	-	-	-	-	-	-	-	1
42	-	-	-	1	-	2	-	4	-	1	-	-	-	-	-	-
43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	2
47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Total	41	49	18	22	31	25	15	16	4	8	46	45	64	58	56	48

Appendix Table 2.--(Cont'd)

Cruise 10, 3/25-28/58

Carapace length (mm)	Tow number 1		2		3		4		5		6		7		8	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
19	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-
20	1	-	-	-	-	-	-	-	-	-	-	-	-	-	5	1
21	2	-	4	-	1	-	-	-	-	-	1	-	5	-	9	1
22	4	2	1	1	-	-	-	-	-	-	-	-	4	2	12	1
23	5	1	15	-	3	-	1	-	-	-	-	-	8	1	7	1
24	3	1	11	-	2	-	-	-	1	-	1	-	4	3	3	3
25	1	5	3	3	3	-	-	-	1	-	-	-	5	4	1	4
26	3	9	4	3	5	-	5	-	3	1	1	1	6	5	2	3
27	2	4	2	2	1	2	4	-	3	-	-	-	1	4	-	5
28	4	7	1	7	9	-	1	-	4	-	-	-	1	5	-	2
29	1	7	1	3	6	-	5	-	6	1	1	2	-	-	-	2
30	1	7	1	2	5	-	7	1	2	-	-	-	-	3	-	2
31	-	6	-	5	2	-	3	2	2	2	-	-	-	3	-	3
32	-	2	1	2	3	-	1	-	1	3	1	1	-	-	-	1
33	1	1	2	1	1	2	-	3	1	3	3	2	-	2	-	-
34	-	2	-	1	2	3	3	-	1	-	-	-	-	1	-	-
35	-	1	-	-	2	3	-	2	1	3	1	-	-	-	-	-
36	-	-	-	-	-	1	1	5	-	5	-	1	-	-	-	-
37	-	-	-	-	1	2	-	2	-	2	1	3	-	-	-	-
38	-	-	-	1	-	6	-	-	-	4	-	1	-	-	-	-
39	-	-	-	-	-	1	-	-	-	2	-	2	-	-	-	-
40	-	-	-	1	-	1	-	-	1	-	-	-	-	-	-	-
41	-	-	-	-	-	2	-	2	-	-	-	1	-	-	-	-
42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	-	-	-	-	-	-	-	2	-	1	-	6	-	-	-	-
44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	-	-	1	-	-	-	-	-	-	-	3	-	-	-	-
47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-
Total	28	55	46	33	46	23	31	19	27	28	10	25	34	33	40	29

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 10(Cont'd) Tow number 9		10		Cruise 11, 4/7-10/58 Tow number 1		2		3		4		5		6		7	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
19	-	1	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
20	2	2	2	1	9	1	-	-	2	-	-	-	-	-	-	-	-	-
21	6	1	2	1	9	2	1	-	4	-	2	1	-	-	-	-	-	-
22	6	2	5	-	8	3	3	1	9	1	1	1	-	-	-	-	-	-
23	12	2	7	-	7	2	5	-	16	3	2	1	-	-	-	-	-	-
24	5	4	5	4	1	6	4	-	8	7	5	-	-	-	-	-	-	-
25	11	6	6	3	1	4	5	1	6	1	2	5	-	-	-	-	1	-
26	2	6	5	6	-	2	2	1	3	4	2	2	1	-	1	-	-	-
27	3	5	3	4	-	2	-	3	1	4	-	7	4	-	1	-	3	-
28	-	-	-	6	-	1	-	2	1	5	-	4	4	-	4	-	1	-
29	-	1	-	4	-	-	-	4	-	3	-	4	11	-	4	-	2	-
30	-	3	-	4	-	-	-	1	-	5	-	4	4	-	2	-	5	-
31	-	-	-	1	-	-	-	7	-	1	-	5	4	1	8	-	5	-
32	-	-	-	3	-	-	-	3	-	1	-	2	4	2	4	3	12	1
33	-	1	-	1	-	-	-	1	-	1	-	2	-	-	5	1	6	1
34	-	-	-	2	-	-	-	2	-	-	-	1	2	5	3	2	2	-
35	-	-	-	1	-	-	-	-	-	-	-	1	-	1	1	2	5	1
36	-	-	-	-	-	-	-	-	-	1	-	1	-	3	-	4	1	7
37	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	5	-	5
38	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	1	-	1
39	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	2	1	1
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	3
41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2
42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
43	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	-	-	-	-	-	-	-	-	1	-	-	-	4	-	2	-	1
47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Total	47	34	36	42	39	23	20	26	50	38	14	42	34	28	33	28	44	26

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 11 (Cont'd) Tow number												Cruise 12, 4/22-25/58 Tow number					
	8		9		10		11		12		13		1		2		3	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
16	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
18	-	-	-	-	-	-	-	1	-	-	-	-	9	-	1	-	-	-
19	-	-	-	-	3	-	1	-	-	-	-	-	5	1	-	-	-	-
20	-	-	-	-	3	-	7	-	2	-	2	-	12	2	1	-	-	-
21	-	-	-	-	10	3	13	2	3	2	2	-	6	6	3	-	1	-
22	1	-	1	-	12	5	8	3	8	1	9	2	5	6	9	2	-	-
23	1	-	-	-	13	8	12	2	14	1	14	1	4	2	6	4	2	1
24	1	-	5	-	15	12	6	6	11	1	7	2	-	8	9	5	1	1
25	1	1	6	-	4	10	1	5	4	3	4	2	1	2	10	4	2	2
26	1	-	6	-	-	11	1	5	1	5	-	2	-	2	7	8	3	3
27	5	-	5	1	1	4	-	8	1	2	-	6	-	2	4	7	2	3
28	9	1	6	-	-	5	1	2	-	4	-	5	-	-	-	8	2	1
29	4	2	7	2	-	6	-	3	-	4	1	3	-	1	1	9	1	3
30	7	1	1	4	-	3	-	4	-	1	-	2	-	1	1	5	1	2
31	9	-	3	4	-	3	-	1	-	1	-	-	-	-	-	6	4	4
32	4	1	-	2	-	-	-	1	-	2	-	-	-	-	-	3	2	4
33	5	2	-	4	-	1	-	1	-	1	-	-	-	-	-	3	2	2
34	1	3	2	3	-	-	-	2	-	-	-	-	-	1	-	1	-	3
35	1	3	-	4	-	-	-	1	-	-	-	-	-	1	-	1	2	1
36	1	3	-	4	-	-	-	-	-	-	-	-	-	-	-	-	2	3
37	-	5	-	1	-	-	-	1	-	-	-	-	-	-	1	-	-	3
38	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	4
39	-	3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	1	-	3
41	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1
42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	-	1	-	3	-	-	-	1	-	-	-	-	-	-	-	-	-	5
44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	2
47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Total	51	29	42	40	61	71	50	51	44	28	39	25	43	36	53	67	27	52

Appendix Table 2.--(Cont'd)

Cruise 12, (Cont'd)

Carapace length (mm)	Tow number 4		5		6		7		8		9		10		11		12	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
18	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	3	-
19	-	-	-	-	-	-	-	-	-	-	1	-	6	-	1	-	14	-
20	-	-	2	-	-	-	-	-	-	-	4	-	8	-	2	-	17	5
21	-	-	1	-	-	-	-	-	1	-	12	1	23	1	1	-	16	5
22	1	-	1	-	-	-	-	-	-	-	16	4	19	3	2	-	4	5
23	-	-	-	1	-	-	-	-	-	-	6	5	18	6	1	-	2	6
24	-	-	2	-	-	-	-	-	-	-	8	6	9	6	1	2	-	9
25	-	1	1	1	-	-	-	-	1	-	6	9	9	5	2	-	-	2
26	1	1	1	-	-	-	-	-	-	-	5	7	4	6	2	-	-	2
27	-	1	-	2	2	-	-	-	3	-	4	13	1	10	3	1	-	1
28	6	1	-	-	4	-	2	-	9	-	-	6	1	8	1	2	-	1
29	13	1	-	3	3	-	4	-	10	-	-	9	1	11	2	1	-	3
30	9	-	-	1	7	1	15	-	9	1	-	9	2	6	2	-	-	-
31	10	-	-	-	3	1	3	-	18	-	-	5	-	5	-	2	-	-
32	11	2	1	-	2	2	10	2	16	1	-	5	-	3	1	2	-	-
33	3	-	5	1	1	2	6	-	7	2	-	6	-	4	-	-	-	-
34	3	2	4	-	3	1	1	-	9	-	-	3	-	-	-	-	-	-
35	2	8	5	2	-	1	2	3	2	3	-	-	-	4	-	3	-	-
36	4	6	2	1	-	12	1	4	2	4	-	-	-	-	-	3	-	-
37	3	9	2	2	-	5	1	4	-	2	-	-	-	2	-	2	-	-
38	1	6	-	1	-	4	-	4	-	3	-	-	-	-	-	1	-	-
39	-	7	-	3	-	6	-	6	-	5	-	-	-	2	-	2	-	-
40	-	3	-	1	-	2	-	2	-	9	-	-	-	-	-	2	-	-
41	-	3	-	1	-	3	-	2	1	5	-	-	-	-	-	2	-	-
42	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
43	-	10	-	15	-	5	1	2	-	4	-	-	-	-	-	7	-	-
44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	2	-	6	-	1	-	3	-	1	-	-	-	-	-	2	-	-
47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	-	1	-	3	-	-	-	-	-	2	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	67	64	27	45	25	46	46	32	88	42	62	88	102	84	21	34	57	39

Appendix Table 2.--(Cont'd)

Cruise 13, 5/6-10/58

Carapace length (mm)	Tow number 1		2		3		4		5		6		7		8	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
18	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-
20	6	1	2	-	3	-	-	-	-	-	-	-	-	-	-	-
21	6	2	7	-	8	1	-	-	-	-	-	-	-	-	-	-
22	15	5	12	2	8	5	-	-	-	-	-	-	2	-	4	-
23	3	4	7	2	5	3	-	-	-	-	-	-	1	-	6	-
24	3	9	5	-	3	6	-	-	-	-	-	-	4	-	7	1
25	-	8	3	2	2	7	-	-	-	-	-	-	3	-	11	5
26	-	2	1	6	2	10	2	-	-	-	2	-	10	-	8	3
27	-	4	1	6	-	7	2	-	-	-	8	1	5	-	3	-
28	-	1	1	2	-	3	-	-	9	-	6	-	1	-	1	3
29	-	2	-	7	-	1	8	-	9	-	15	1	3	5	-	8
30	-	-	-	3	-	4	7	-	13	1	24	1	1	6	-	10
31	-	-	-	4	-	2	11	-	12	1	19	-	1	9	-	12
32	-	-	-	-	-	1	7	2	15	-	21	-	1	6	-	9
33	-	-	-	-	-	-	10	1	16	2	15	3	2	5	-	4
34	-	-	-	-	-	-	3	7	6	-	5	3	-	6	-	6
35	-	-	-	-	-	-	4	2	2	-	7	-	1	4	-	-
36	-	-	-	-	-	1	2	5	2	4	3	9	-	6	-	-
37	-	-	-	-	-	-	3	10	1	5	2	10	-	4	-	2
38	-	-	-	-	-	-	-	3	-	6	-	9	-	1	-	1
39	-	-	-	-	-	-	-	7	-	5	-	9	-	1	-	1
40	-	-	-	-	-	-	1	5	-	3	-	4	-	4	-	2
41	-	-	-	-	-	-	-	2	-	3	1	11	-	1	-	-
42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	-	-	-	-	-	-	1	3	-	12	-	23	-	1	-	1
44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	-	-	-	-	-	-	4	-	5	-	2	-	-	-	-
47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	-	-	-	-	-	-	-	-	-	3	-	1	-	-	-	-
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-
53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
55	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Total	34	38	40	34	33	51	61	53	85	51	128	87	35	60	40	68

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 13, (Cont'd) Tow number 9		10		11		Cruise 14, 5/22-25/58 Tow number 1		2		3		4		8	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
16	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	9	-	1	-	1	-	3	-	-	-	-	-	-	-	1	-
20	20	4	1	-	2	-	3	-	1	-	-	1	-	-	-	-
21	17	6	7	-	9	-	2	1	1	1	1	-	-	-	11	-
22	13	7	11	-	15	3	5	1	3	1	3	1	-	-	13	1
23	3	9	9	1	10	11	11	2	1	-	1	-	1	-	21	4
24	1	12	15	5	11	11	6	5	1	-	1	2	-	-	20	8
25	-	11	6	12	3	12	5	8	1	3	1	1	-	-	6	7
26	1	9	3	13	2	13	10	8	1	4	1	2	-	-	1	6
27	-	11	-	15	2	14	3	6	-	3	1	1	2	-	-	5
28	-	7	-	19	1	8	-	6	1	2	-	4	3	-	-	11
29	-	5	-	13	-	4	1	6	1	3	-	1	4	-	-	6
30	-	2	-	6	-	5	-	3	1	-	-	-	1	-	-	3
31	-	-	-	6	-	1	-	2	-	1	-	1	4	3	-	4
32	-	2	-	4	-	1	-	2	-	1	-	-	1	2	-	1
33	-	3	-	4	-	2	-	1	1	3	-	-	1	-	-	1
34	-	2	-	1	-	-	-	2	2	3	-	-	-	-	-	-
35	-	2	-	1	-	3	-	-	-	1	-	1	-	1	-	-
36	-	1	-	2	-	1	-	1	-	2	-	-	-	3	-	1
37	-	-	-	-	-	1	-	1	-	3	-	-	1	-	-	-
38	-	-	-	2	-	2	-	-	-	4	-	-	1	-	-	-
39	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-
40	-	-	-	-	-	-	-	1	-	3	-	-	-	-	-	-
41	-	-	-	1	-	-	-	1	-	1	-	-	-	1	-	-
42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	-	-	-	-	-	-	-	-	-	3	-	-	-	2	-	-
44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Total	72	93	53	105	56	92	49	59	15	45	9	15	19	12	73	58

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 14 (Cont'd) Tow number 9		10		11		Cruise 15, 6/9-10/58 Tow number 1		2		3		Cruise 16, 7/16-18/58 Tow number 1		2		3	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
17	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	1	-	4	1	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	2	-	5	3	-	1	-	-	5	2	-	-	-	-
21	1	-	-	-	2	-	13	-	5	-	2	-	15	2	-	-	-	-
22	1	-	-	-	3	-	21	3	18	2	7	-	11	-	-	2	-	-
23	3	-	-	-	2	1	14	3	15	4	9	2	15	5	1	-	-	-
24	3	-	5	-	-	4	7	1	4	5	9	3	21	6	3	-	-	-
25	7	-	4	1	-	1	2	5	6	10	5	-	24	8	4	2	-	-
26	13	-	6	-	-	-	-	7	-	11	5	4	13	5	4	1	-	-
27	14	3	10	-	-	-	-	7	-	7	-	13	15	21	15	1	-	-
28	3	3	4	-	-	-	-	5	-	8	-	7	5	13	23	1	-	-
29	-	4	-	4	-	-	-	3	-	3	-	5	4	26	21	2	1	-
30	-	1	-	4	-	-	-	5	-	1	-	3	-	31	18	-	-	-
31	3	9	-	4	-	-	-	3	-	1	-	4	1	21	8	7	1	-
32	-	5	1	4	-	-	-	3	-	1	-	-	-	6	6	7	-	-
33	-	9	-	-	-	-	-	-	-	-	-	1	-	3	-	7	1	-
34	-	4	-	5	-	-	-	-	-	-	-	1	-	4	1	8	-	-
35	-	2	-	4	-	-	-	-	-	-	-	-	-	1	-	7	-	1
36	-	1	-	-	-	-	-	-	-	-	-	-	-	4	1	9	-	1
37	-	1	-	3	-	-	-	-	-	-	-	-	-	3	-	8	-	-
38	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-
39	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	5	-	1
40	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-
41	-	1	-	2	-	-	-	-	-	-	-	1	-	-	-	5	-	2
42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
43	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	3	-	-
44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-
46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
47	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Total	48	48	30	33	10	6	68	98[1/]	48	54	37	45	129	161	105	95	3	6

1/ 48 not measured.

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 16 (Cont'd) Tow number															
	4		5		6		7		8		9		10		11	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
17	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
18	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
19	-	-	-	-	-	-	-	-	-	1	2	-	2	-	3	-
20	-	-	-	-	-	-	-	-	1	1	5	-	3	1	9	1
21	-	-	-	-	-	-	2	-	2	-	5	3	11	1	10	-
22	-	-	-	-	1	-	7	1	3	-	9	4	22	1	7	3
23	1	-	-	-	1	-	14	2	2	2	10	3	33	-	9	3
24	-	-	-	-	-	-	9	3	1	-	20	7	42	2	15	7
25	1	-	-	-	9	-	13	5	2	2	30	5	31	8	12	7
26	8	-	5	-	17	-	16	8	3	3	15	7	11	10	4	5
27	15	-	18	-	9	-	-	11	1	5	11	5	-	27	4	7
28	20	-	17	1	9	1	3	17	-	3	2	13	1	28	1	7
29	19	-	32	-	5	-	5	16	-	4	2	16	-	26	-	14
30	9	1	16	-	3	1	1	10	-	4	1	12	-	26	-	6
31	8	-	13	1	-	1	-	7	-	4	-	12	-	20	-	13
32	6	1	9	1	3	4	-	6	-	6	-	4	-	14	-	7
33	1	2	4	-	-	7	1	5	-	7	-	3	1	10	-	5
34	3	2	1	1	-	4	-	7	-	12	-	3	1	-	-	7
35	1	14	-	2	-	3	-	5	-	10	-	1	-	1	-	4
36	-	10	-	2	1	7	-	4	-	1	-	-	1	1	-	-
37	-	3	-	2	-	4	-	1	-	-	-	1	-	2	-	-
38	-	3	-	9	-	2	-	3	-	1	-	1	-	-	-	-
39	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-
40	1	3	-	7	-	1	-	2	-	1	-	-	-	-	-	-
41	-	1	-	1	-	-	-	-	-	1	-	-	-	-	-	-
42	-	1	-	3	-	1	-	-	-	-	-	-	-	-	-	-
43	-	2	-	2	-	1	-	2	-	-	-	-	-	-	-	-
44	-	6	-	5	-	1	-	-	-	-	-	-	1	-	-	-
45	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
46	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-
47	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
48	-	2	-	-	-	1	-	-	-	-	-	-	-	-	-	-
49	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Total	93	58	115	55	58	39	71	116	15	68	113	100	161	178	74	98

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 17, 7/24-27/58 Tow number 1		2		3		4		5		6		7		8	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
15	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
16	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-
17	-	-	-	-	-	-	-	-	1	-	-	-	-	-	3	2
18	1	1	2	-	-	-	-	-	-	1	-	-	-	-	3	2
19	-	1	3	-	-	-	-	-	4	-	-	-	-	-	14	3
20	1	-	5	1	-	-	-	-	3	2	-	-	-	-	19	1
21	8	2	10	-	1	-	-	-	7	1	-	-	1	-	51	12
22	12	4	17	2	3	-	2	-	4	1	-	-	4	-	85	12
23	11	4	8	1	1	-	-	-	5	1	-	-	3	2	67	15
24	5	6	10	8	4	4	3	1	4	5	-	-	9	2	45	25
25	3	7	4	11	2	2	11	-	-	3	10	-	12	4	19	33
26	1	7	2	8	4	-	9	2	1	6	11	-	8	5	10	45
27	1	10	1	11	8	3	11	1	5	8	14	-	2	3	5	43
28	-	9	1	14	2	2	3	2	-	5	8	-	2	6	-	34
29	-	5	-	12	-	3	2	3	2	4	4	-	-	7	-	38
30	-	5	-	6	-	8	1	6	-	3	-	1	-	17	-	23
31	-	3	-	3	-	8	-	9	1	7	-	5	-	9	-	21
32	-	4	-	4	-	7	-	8	-	6	-	7	-	13	-	21
33	-	2	-	3	-	12	-	11	-	8	-	11	-	4	-	11
34	-	2	-	1	-	3	-	4	-	4	-	8	-	3	-	2
35	-	-	-	-	-	4	-	8	-	3	-	5	-	-	-	4
36	-	-	-	-	-	3	-	1	-	2	-	7	-	1	-	1
37	-	-	-	-	-	2	-	1	-	2	-	1	-	2	-	1
38	-	-	-	1	-	2	-	1	-	-	-	1	-	-	-	1
39	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-
40	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
41	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-
Total	43	72	63	88	25	63	42	62	37	72	47	48	41	78	322	351

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 18, 8/5-8/58 Tow number												Cruise 19, 8/22-23/58 Tow number					
	1		2		3		4		5		6		1		2		3	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
17	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
18	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2	1	3	1
19	-	-	-	-	-	-	-	-	-	-	-	-	3	1	1	1	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-	3	5	1	1	1	2
21	-	-	-	-	-	-	-	-	-	-	-	-	2	3	3	-	1	1
22	1	-	1	-	-	-	-	-	-	-	-	-	3	3	2	3	2	1
23	1	-	-	-	-	-	-	-	-	-	-	-	1	4	-	-	3	-
24	2	1	2	-	-	-	-	-	-	-	1	-	2	1	2	-	1	-
25	5	-	2	-	2	-	-	-	-	-	-	-	7	-	3	1	4	-
26	8	-	3	-	10	-	1	-	-	-	6	-	8	-	7	1	1	-
27	1	1	8	1	12	-	1	-	3	-	17	-	13	-	8	-	6	3
28	2	1	12	-	6	1	9	-	7	-	22	-	9	5	8	2	3	1
29	1	1	4	3	3	2	24	-	6	3	12	-	6	3	6	2	3	4
30	-	1	1	-	1	7	15	-	4	-	4	1	1	2	1	2	-	1
31	-	7	2	5	3	9	17	-	1	-	1	-	1	5	-	6	-	5
32	-	5	1	8	-	8	4	1	1	-	1	1	-	10	-	1	-	5
33	-	1	-	6	2	8	3	2	3	-	-	1	-	9	-	3	-	8
34	-	-	2	3	2	8	2	1	1	-	-	5	-	5	-	3	-	3
35	-	1	1	4	1	2	1	3	1	3	-	10	-	7	-	7	-	9
36	-	-	-	5	1	4	1	4	1	3	-	3	-	5	-	10	-	4
37	-	1	-	3	-	2	-	7	-	-	-	2	-	-	-	2	-	2
38	-	-	-	2	-	4	-	6	-	1	-	7	-	4	-	-	-	3
39	-	-	-	-	-	1	-	7	-	3	-	5	-	-	-	-	-	-
40	-	-	-	2	-	1	-	7	-	3	-	2	-	-	-	1	-	-
41	-	1	-	4	-	1	-	2	-	2	-	-	-	1	-	-	-	-
42	-	-	-	-	-	-	-	2	-	6	-	3	-	-	-	-	-	-
43	-	-	-	2	-	3	-	-	-	2	-	2	-	-	-	-	-	-
44	-	-	-	2	-	-	-	2	-	2	-	1	-	-	-	-	-	-
45	-	-	-	-	-	-	-	3	-	4	-	-	-	-	-	-	-	-
46	-	-	-	2	-	3	-	-	-	1	-	1	-	-	-	-	-	-
47	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Total	21	21	39	53	43	64	78	47	28	39	64	44	61	76	44	47	28	54

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 19, (Cont'd) Tow number 4		5		6		7		11		12		13		14	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
16	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-
17	-	-	-	-	-	-	-	-	-	-	-	1	1	4	1	2
18	1	1	-	-	-	-	-	-	-	-	-	-	3	3	4	2
19	-	1	-	-	-	-	-	-	-	-	-	1	2	5	7	5
20	-	-	-	-	-	-	-	-	-	-	2	1	7	4	19	9
21	2	-	-	-	-	-	-	-	-	-	1	-	4	9	8	7
22	-	-	-	-	-	-	-	-	-	-	-	-	4	5	4	6
23	1	-	-	-	-	-	-	-	-	-	-	1	5	6	4	6
24	1	-	1	-	2	-	-	-	-	-	1	-	13	3	6	7
25	13	-	2	-	5	-	-	-	2	-	2	-	6	5	3	1
26	9	-	4	-	6	-	1	-	3	-	4	-	6	2	7	3
27	11	2	4	-	6	-	-	-	6	-	3	-	10	1	5	1
28	6	3	8	-	7	-	1	-	9	1	15	-	3	3	6	4
29	3	9	6	-	10	-	1	-	7	1	4	-	3	7	1	5
30	2	13	2	1	4	-	-	-	5	3	3	-	1	11	-	4
31	-	7	-	1	2	2	2	-	-	4	1	4	-	8	-	3
32	-	7	1	3	1	6	1	-	-	6	-	7	-	11	-	4
33	-	15	-	6	-	1	-	-	-	10	1	10	-	13	-	4
34	-	13	1	6	-	4	1	-	1	9	-	9	-	10	-	1
35	-	13	-	12	1	6	-	-	-	5	-	6	-	6	-	4
36	-	3	-	11	-	8	-	-	-	6	1	5	-	10	-	1
37	-	2	-	9	-	2	-	-	-	7	1	4	-	2	-	-
38	-	2	-	3	-	3	-	2	-	6	-	2	-	1	-	1
39	-	1	-	3	-	5	-	-	-	2	-	1	-	3	-	-
40	-	1	-	4	-	3	-	-	-	3	-	-	-	1	-	-
41	-	-	-	4	-	2	-	-	-	1	-	-	-	-	-	-
42	-	-	-	4	-	2	-	1	-	1	-	1	-	-	-	-
43	-	-	-	1	-	-	-	2	-	-	-	1	-	1	-	-
44	-	-	-	2	-	-	-	1	-	-	-	1	-	-	-	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Total	49	93	29	72	44	44	7	6	33	65	39	55	69	135	76	80

Appendix Table 2.--(Cont'd)
Cruise 20, 9/8-12/58

Carapace length (mm)	Tow number 1		2		3		4		5		6		7		8	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
10	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	8	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
13	20	17	-	1	-	1	-	-	-	-	-	-	-	-	-	-
14	18	20	-	5	-	-	-	-	-	-	-	-	-	-	-	-
15	17	25	5	8	-	1	-	-	-	-	-	-	-	-	-	-
16	20	20	5	7	-	-	1	-	-	-	-	-	-	-	-	-
17	8	19	9	11	-	1	-	-	-	-	-	-	-	-	-	-
18	8	14	5	6	-	-	-	-	-	-	-	-	-	-	-	-
19	4	5	3	4	2	-	1	-	-	-	-	-	1	-	-	-
20	1	1	4	6	1	1	1	-	1	1	-	-	-	-	-	-
21	1	-	4	1	-	-	2	1	-	-	-	-	-	-	-	-
22	-	1	1	2	3	-	1	1	-	-	-	-	-	-	-	-
23	-	-	4	1	-	-	-	1	1	-	-	-	-	-	-	-
24	-	1	1	1	3	-	1	-	-	-	-	-	-	-	-	-
25	1	-	1	1	1	-	1	-	-	-	-	-	-	-	-	-
26	1	-	-	-	5	-	-	1	-	-	-	-	-	-	-	-
27	-	1	-	1	1	-	9	-	-	-	-	-	-	-	-	-
28	1	2	-	-	5	1	6	-	3	-	-	-	-	-	3	-
29	1	2	-	-	11	1	12	-	7	-	1	-	4	-	1	-
30	-	1	-	-	11	1	7	-	10	-	12	-	6	-	6	-
31	-	-	-	-	5	-	1	-	6	-	8	-	13	-	7	-
32	-	2	-	1	2	-	1	-	3	-	4	-	7	2	5	-
33	-	6	-	-	1	-	-	1	1	-	2	-	2	-	2	-
34	-	1	-	-	-	1	-	2	3	-	1	1	-	-	1	-
35	-	2	-	-	1	2	-	5	-	3	-	1	-	-	1	-
36	-	1	-	2	1	1	-	1	-	3	-	3	-	-	1	1
37	-	-	-	-	-	5	-	5	-	3	1	1	-	2	1	3
38	-	-	-	1	-	4	-	2	-	5	1	7	-	7	-	1
39	-	-	-	-	-	3	-	4	-	6	-	8	1	8	-	6
40	-	-	-	-	-	10	-	2	-	4	-	4	-	5	-	6
41	-	-	-	-	-	3	-	1	-	3	-	9	1	4	-	1
42	-	-	-	-	-	-	-	-	-	2	-	4	-	7	-	8
43	-	-	-	-	-	2	-	1	-	-	-	2	-	3	-	3
44	-	-	-	-	-	-	-	-	-	1	-	-	-	2	-	4
45	-	-	-	-	-	-	-	-	-	3	-	2	-	5	-	-
46	-	-	-	-	-	1	-	1	-	1	-	1	-	-	-	2
47	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-
48	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-
49	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Total	111	145	43	59	53	39	44	29	35	35	30	47	35	48	28	35

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 20, (Cont'd) Tow number															
	9		10		11		12		13		14		15		16	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
13	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-
14	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2
15	-	-	-	-	-	1	-	5	2	-	-	-	-	1	1	2
16	-	-	-	-	1	-	3	9	2	1	-	-	-	1	2	9
17	-	-	-	-	2	-	2	9	1	1	-	-	-	1	3	7
18	-	-	-	-	1	4	3	3	2	2	-	-	-	4	6	6
19	1	-	-	-	2	6	4	6	1	1	-	-	-	1	8	7
20	-	-	-	-	3	2	2	4	2	3	-	-	1	1	3	6
21	-	-	-	-	5	5	2	2	2	-	-	-	1	2	2	7
22	-	-	-	-	1	2	2	2	2	1	-	1	-	-	1	3
23	-	-	-	-	2	3	8	1	1	3	1	-	1	-	2	4
24	-	-	-	-	3	4	-	1	1	3	1	-	-	1	1	1
25	-	-	-	-	3	1	1	1	2	-	-	-	-	1	-	2
26	-	-	-	-	3	-	-	-	3	-	-	-	-	-	1	1
27	1	-	1	-	6	1	-	-	3	1	1	-	1	-	-	1
28	-	-	1	-	3	1	2	-	2	-	1	-	4	-	2	1
29	-	-	5	-	3	-	-	-	7	-	6	-	3	-	-	-
30	1	-	4	-	-	-	-	1	1	-	6	-	5	-	-	-
31	1	-	2	-	1	-	-	1	1	2	3	-	-	-	-	-
32	3	-	2	-	-	1	-	1	-	2	-	-	1	-	1	-
33	1	-	5	-	-	3	-	1	-	2	2	-	-	-	-	-
34	1	-	-	-	-	6	-	1	-	2	1	-	-	-	-	-
35	-	-	1	4	-	5	-	-	-	2	-	-	-	-	-	-
36	-	-	-	1	-	2	-	-	-	1	-	2	-	-	-	1
37	-	-	-	6	-	-	-	1	-	5	-	1	-	1	-	3
38	-	2	-	1	-	2	-	-	-	-	-	7	-	2	-	-
39	-	-	-	2	-	1	-	-	-	-	-	4	-	1	-	-
40	-	-	-	2	-	-	-	-	-	2	-	1	-	-	-	1
41	-	-	-	3	-	-	-	-	-	-	-	2	-	-	-	-
42	-	2	-	1	-	-	-	-	-	-	-	1	-	-	-	-
43	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-
44	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
46	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-
47	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
48	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Total	9	6	21	22	39	50	29	51	35	34	22	21	17	20	34	65

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 20 (Cont'd) Tow number 17		18		19		Cruise 21, 9/23-27/58 Tow number 1		2		3		4		5	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
13	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-
15	1	-	-	1	1	-	-	-	-	-	2	1	-	1	-	-
16	1	2	-	6	2	-	3	-	-	-	2	-	-	-	-	-
17	3	1	-	5	-	4	5	1	-	-	5	3	4	1	-	-
18	7	3	-	1	1	2	4	7	-	1	4	5	8	3	-	-
19	2	6	3	9	4	1	3	6	2	2	3	6	3	3	1	-
20	4	4	-	5	-	2	-	8	-	-	5	7	2	5	1	1
21	2	1	4	8	2	3	2	4	-	-	6	4	6	5	4	4
22	1	-	6	1	-	-	1	3	-	1	5	7	1	6	5	1
23	3	2	3	4	-	-	1	-	-	-	7	6	2	3	1	2
24	3	-	1	-	-	2	1	-	1	-	3	2	1	1	1	6
25	-	1	2	2	1	1	-	1	-	-	11	4	-	-	2	3
26	3	-	2	2	4	1	2	-	-	-	4	1	4	5	-	2
27	3	-	3	-	3	1	2	5	-	-	1	-	-	3	-	2
28	6	1	5	-	4	-	-	1	-	-	-	1	-	2	-	-
29	2	-	1	1	2	-	1	5	-	-	-	-	1	4	1	-
30	2	-	1	-	3	2	-	3	-	-	1	-	-	-	1	-
31	1	1	1	1	1	-	-	2	-	-	1	2	-	-	9	-
32	-	-	-	-	-	1	-	-	-	-	-	-	1	-	4	-
33	-	2	-	2	-	1	-	2	-	-	-	1	1	1	1	-
34	-	2	-	2	-	2	-	1	-	1	-	2	-	1	3	-
35	-	2	-	-	1	6	-	2	-	1	-	1	-	6	1	-
36	-	-	-	1	-	4	-	3	-	-	-	1	-	-	3	-
37	-	3	-	3	-	4	-	1	-	-	-	-	-	3	2	2
38	-	-	-	1	-	3	-	-	-	-	-	2	-	1	1	-
39	-	-	-	-	-	2	-	-	-	-	-	-	-	1	-	1
40	-	1	-	2	-	-	-	-	-	-	-	-	-	1	-	5
41	-	-	-	-	-	1	-	-	-	-	-	-	-	2	-	3
42	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1
43	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2
44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
47	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Total	45	33	32	57	29	44	25	55	3	6	60	56	35	61	41	43

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 21 (Cont'd) Tow number 6		7		8		9		10		12		14		15	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
16	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
17	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3	-
18	2	1	-	-	-	-	-	-	-	-	-	-	2	1	6	3
19	-	-	-	-	-	-	1	1	-	-	-	-	1	1	5	3
20	4	3	-	-	-	-	1	-	-	-	-	-	3	1	2	6
21	6	4	1	-	-	1	-	-	-	-	-	-	1	1	1	9
22	4	3	1	1	4	3	-	1	-	-	-	-	-	1	5	4
23	1	4	2	1	-	-	-	1	-	-	-	-	-	-	2	1
24	1	4	2	2	-	1	-	-	-	-	-	-	-	-	-	1
25	5	-	2	1	-	1	-	-	1	1	-	-	-	-	-	2
26	3	2	1	-	-	1	1	-	-	-	-	1	-	1	-	2
27	2	3	-	-	-	-	1	-	-	-	-	-	1	-	-	-
28	-	1	-	-	-	-	3	2	-	-	-	-	-	-	-	-
29	-	1	-	-	1	-	3	-	-	-	-	-	3	2	-	1
30	-	-	1	-	2	-	1	-	-	-	-	-	1	2	1	-
31	-	-	2	-	3	-	-	-	-	-	-	-	-	-	-	-
32	5	-	1	-	9	-	4	2	-	-	-	-	-	1	1	-
33	2	-	2	-	4	-	-	-	-	-	-	1	-	5	-	4
34	1	-	3	-	7	-	-	1	-	1	-	-	-	5	-	1
35	2	-	3	-	-	1	-	6	-	-	-	2	1	11	-	4
36	2	-	1	-	1	-	-	5	-	1	-	-	-	9	-	9
37	1	-	-	-	-	-	-	14	-	-	-	1	-	14	-	4
38	-	-	2	-	-	2	-	9	-	-	-	1	-	5	-	4
39	-	1	1	2	2	3	1	8	-	1	-	-	-	6	-	1
40	-	2	-	2	-	3	-	7	-	-	-	1	-	1	-	-
41	-	2	-	2	-	3	-	2	-	-	-	1	-	2	-	-
42	-	-	-	-	-	5	-	1	-	-	-	-	-	-	-	-
43	-	1	-	3	-	3	-	1	-	-	-	-	-	-	-	-
44	-	1	-	4	-	2	-	1	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	2	-	4	-	6	-	2	-	-	-	-	-	1	-	-
47	-	-	-	5	-	3	-	-	-	-	-	-	-	-	-	-
48	-	-	-	3	-	4	-	-	-	-	-	-	-	-	-	-
49	-	3	-	4	-	2	-	1	-	-	-	-	-	-	-	-
50	-	-	-	-	-	2	-	1	-	-	-	-	-	1	-	-
51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
54	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	41	40	25	36	33	46	16	66	1	4	-	8	13	73	26	60

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 21 (Cont'd) Tow number 16		17		18		Cruise 22, 10/17-19/58 Tow number 1		2		3		4		5	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
13	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	1	4	1	1	3	3	1	-	1	1
16	-	-	-	-	-	-	2	3	10	10	1	1	3	1	4	1
17	1	-	-	-	-	-	6	1	15	8	2	4	1	2	7	3
18	1	-	-	-	1	2	4	3	20	15	3	4	4	1	5	6
19	4	3	-	-	9	1	3	3	17	14	6	5	1	8	-	4
20	3	3	-	1	3	3	2	4	5	4	1	10	4	4	2	2
21	5	1	2	1	9	10	1	1	1	5	1	2	2	5	2	2
22	8	6	3	-	5	6	3	4	2	3	1	2	2	2	-	5
23	2	3	1	1	5	7	4	2	1	-	-	3	4	3	-	2
24	13	5	1	-	3	5	4	3	1	-	-	1	2	-	-	-
25	7	10	1	2	3	4	7	3	2	-	-	-	5	1	-	-
26	6	4	3	-	1	-	4	3	1	2	1	-	4	3	-	-
27	9	4	1	1	-	6	3	4	-	-	-	-	2	-	-	1
28	7	1	3	2	-	-	-	2	-	1	1	-	-	5	-	-
29	6	-	-	4	1	2	-	2	1	-	1	-	2	1	-	-
30	2	3	1	-	1	2	-	2	1	1	2	-	-	3	1	-
31	1	1	1	1	-	-	-	1	-	-	1	2	1	5	2	1
32	2	1	8	2	1	-	-	-	-	1	1	4	1	4	-	1
33	-	2	2	1	2	-	-	4	-	1	-	3	-	3	1	1
34	-	3	2	2	-	2	-	3	-	-	-	1	-	1	-	-
35	1	3	-	3	1	-	-	2	1	4	-	1	-	3	-	1
36	-	3	1	2	-	1	-	-	-	1	-	3	-	3	-	1
37	-	1	-	6	-	-	-	3	-	2	-	3	-	1	1	5
38	-	3	-	3	1	-	-	-	-	-	-	2	-	2	-	3
39	-	-	1	4	-	-	-	-	-	1	-	3	-	2	-	5
40	-	2	-	4	-	1	-	-	-	-	-	2	-	-	-	1
41	-	1	-	5	-	2	-	-	-	1	-	1	-	-	-	5
42	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	1
43	-	-	-	3	-	-	-	-	-	-	-	-	-	1	-	-
44	-	-	-	4	-	1	-	-	-	-	-	-	-	-	-	1
45	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	2
Total	78	63	31	59	46	55	44	58	80	75	25	60	39	64	26	55

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 22 (Cont'd) Tow number 6		7		8		9		Cruise 23, 11/4-7/58 Tow number 1		2		3		4	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
14	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	2	2	-	-	-	-	-	-	-	-	-	-	1	1
16	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-
17	1	3	3	9	-	-	-	-	-	-	-	1	-	-	3	-
18	3	2	3	1	1	-	-	1	2	2	-	-	-	-	1	1
19	1	2	5	3	-	-	-	-	1	5	2	2	-	-	1	-
20	1	2	4	7	-	-	-	1	4	5	1	2	-	-	-	2
21	-	-	2	5	-	-	-	-	10	5	5	5	-	-	4	2
22	2	3	-	2	1	-	-	2	4	7	8	4	-	1	2	1
23	1	3	2	2	-	-	1	2	5	9	14	3	1	-	2	2
24	-	-	2	1	1	-	-	-	1	4	11	8	-	-	1	1
25	-	-	5	1	3	-	2	-	4	8	9	5	3	1	1	4
26	2	3	2	2	5	1	4	2	2	1	5	5	2	-	-	2
27	1	1	1	-	12	1	4	3	-	1	2	5	-	1	2	2
28	4	1	-	1	11	1	9	3	3	2	6	-	3	1	2	1
29	3	-	1	2	8	2	8	8	1	-	-	2	3	1	1	-
30	3	2	-	-	4	5	5	5	4	1	4	3	2	-	5	-
31	2	5	-	-	3	2	1	12	3	2	2	3	4	1	-	2
32	2	1	-	-	2	1	1	1	-	-	4	3	4	1	-	1
33	-	1	1	1	3	1	1	4	1	1	-	3	1	2	-	2
34	-	-	-	1	1	1	-	1	-	1	1	1	3	1	-	2
35	-	2	-	-	-	1	2	2	-	4	-	1	1	1	-	-
36	-	2	-	2	-	-	-	2	-	3	-	-	1	-	-	3
37	-	2	-	-	-	1	-	-	-	2	-	1	1	1	-	3
38	-	1	-	1	-	1	-	1	-	5	-	-	-	1	-	1
39	-	1	-	1	-	-	-	-	-	2	-	-	-	1	-	-
40	-	2	-	1	-	-	-	-	-	1	-	1	-	1	-	-
41	-	2	-	-	-	1	-	1	-	2	-	-	-	1	-	-
42	-	1	-	-	-	1	-	-	-	1	-	1	-	1	-	-
43	-	-	-	2	-	1	-	1	-	1	-	-	-	3	-	-
44	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-
45	-	-	-	-	-	1	-	-	-	-	-	-	-	2	-	-
46	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-
47	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Total	26	43	33	53	55	23	38	52	45	75	74	59	29	30	26	33

Appendix Table 2.--(Cont'd)

Carapace length (mm)	Cruise 23 (Cont'd) Tow number 5		6		7		8		9		10		11		12	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
15	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	3	1	3	-	1	-	-	-	-	-	-	-	-	-	-	-
20	5	-	2	-	3	1	-	-	-	-	-	-	-	-	1	1
21	2	1	1	1	6	3	-	-	-	-	-	-	-	-	3	-
22	1	3	6	1	10	4	-	-	-	-	2	-	-	-	6	1
23	1	2	3	1	10	7	-	-	-	-	-	-	1	-	3	2
24	-	2	-	2	12	6	-	-	-	-	-	-	2	2	2	2
25	-	2	2	3	11	7	1	-	-	-	-	-	7	2	4	1
26	1	-	1	1	6	4	-	-	-	-	1	1	6	1	5	4
27	-	1	-	4	8	1	-	-	-	-	1	-	4	6	3	2
28	-	3	1	1	-	1	-	-	-	-	-	1	3	2	1	2
29	1	1	1	1	2	2	-	-	2	-	-	-	3	3	-	1
30	-	-	1	-	-	3	-	-	3	-	1	-	8	4	3	3
31	-	1	2	1	-	1	-	-	8	-	8	-	11	1	2	2
32	-	-	2	1	-	-	9	-	6	5	6	2	7	1	-	-
33	1	2	1	1	-	-	3	-	4	3	5	3	3	1	-	3
34	-	1	-	-	-	-	6	-	3	3	1	-	2	4	-	2
35	-	3	-	1	-	-	3	-	2	4	2	6	2	1	-	1
36	-	1	-	1	-	-	4	-	2	2	3	5	1	2	-	1
37	1	1	-	1	-	1	2	-	-	2	1	3	1	1	-	1
38	-	4	-	3	-	-	1	-	-	1	-	-	-	-	-	-
39	-	2	-	2	-	-	-	-	-	-	-	-	-	-	1	-
40	-	-	-	3	-	-	-	3	-	-	-	-	-	-	-	3
41	-	1	-	1	-	1	-	5	-	1	1	2	-	1	-	-
42	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-
43	-	2	-	-	-	-	-	5	-	1	-	-	-	2	-	-
44	-	-	-	1	-	-	-	2	-	-	-	3	-	1	-	-
45	-	-	-	-	-	-	-	2	-	1	-	1	-	-	-	-
46	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	1
47	-	-	-	-	-	-	-	1	-	1	-	1	-	2	-	1
48	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-
49	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
50	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Total	21	38	26	31	69	42	29	22	30	26	32	35	61	37	34	34

Appendix Table 3.--Size equivalents for shrimp, P. duorarum Burkenroad

Carapace length (mm.)	Total length (mm.) (includes rostrum)	Count per pound (heads off)
20	87	110
21	90	100
22	93	92
23	97	83
24	100	74
25	103	67
26	107	60
27	110	55
28	113	51
29	117	46
30	120	42
31	123	39
32	127	36
33	130	33
34	133	31
35	137	28
36	140	26
37	143	25
38	147	23
39	150	21
40	153	20
41	156	19
42	160	18
43	163	17
44	166	16
45	170	15
46	173	14
47	176	13
48	180	13
49	183	12
50	186	11

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